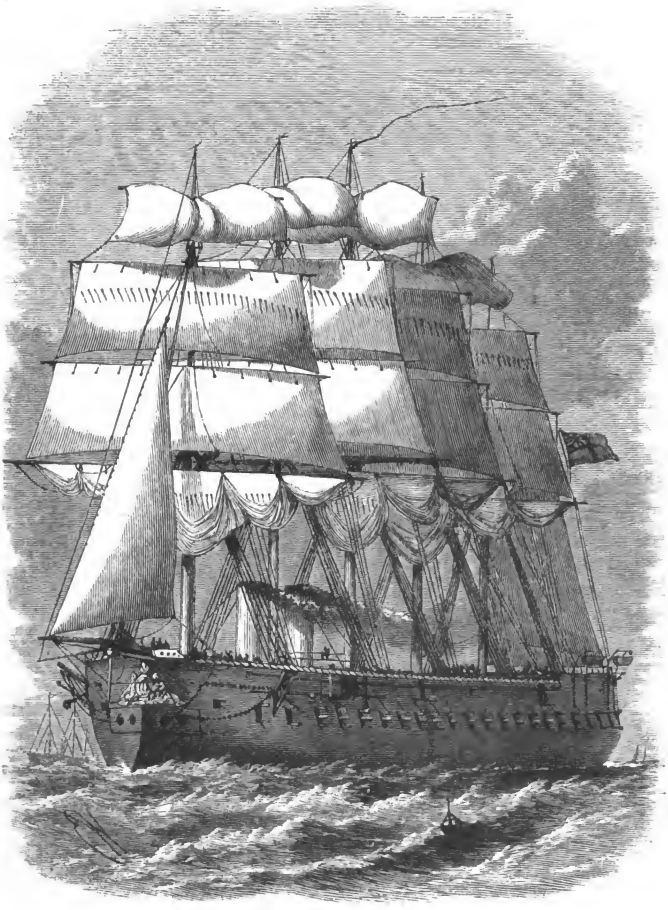


THE "MINOTAUR."

# THE BOY'S OWN

# BOOK OF BOATS.

INCLUDING VESSELS OF EVERY RIG AND SIZE
TO BE FOUND FLOATING ON THE WATERS IN ALL PARTS
OF THE WORLD:

TOGETHER WITH COMPLETE INSTRUCTIONS

HOW TO MAKE SAILING MODELS.

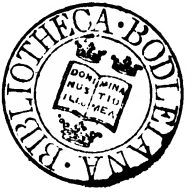
BY

W. H. G. KINGSTON,

AUTHOR OF "ERNEST BRACEBRIDGE; OR, BOY'S OWN BOOK OF SPORTS,"
ETC. ETC.

*WITH NUMEROUS ILLUSTRATIONS, DRAWN BY EDWARD WEEDON,*
*ENGRAVED BY W. J. LINTON.*

New Edition.
REVISED THROUGHOUT.

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# PREFACE.



My endeavour in the following pages has been to give my young friends an account of the vessels and boats, of every rig and size, to be found floating on the waters in all parts of the world. I hope that I may have in most points succeeded; but the subject is a very extensive one, and I dare say that there are many craft in various directions differing from those I have described, though not, I believe, in any material respect. I have written for those who wish really to gain useful information about vessels. For the general reader I might have made the work far more interesting by introducing anecdotes and stories; but I should have thus not carried out my object in giving the book which is wanted.

Every English boy, indeed, should be well informed on nautical affairs, and will, I therefore hope, find in the following pages the information he requires.

Another edition having been called for, I have added in two long chapters a description of the numerous inventions which have been introduced into the navy, with the object of making steam-vessels efficient men-of-war. Since the first edition of this work appeared, the changes have been very great. The *Mersey* was then considered one of the finest ships in the service, and her armament was more powerful than any ship had ever before carried. As a fighting ship, in the condition in which she then was, she would now be looked upon as useless and utterly unable to contend with even a small-sized armour-plated craft carrying two or three modern guns.

I have greatly improved a part of the work, which my young readers will especially value, describing how to build and rig models of yachts capable of sailing; and I hope, with the hints I have given, that many of them will be able to build and fit out vessels capable of

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contending for the prizes on the Serpentine, and at other miniature yacht-races. I admit, that without some practical knowledge or good models, it is very difficult for a person to build a satisfactory craft; still I believe that my book will help him as much as a book can well do so. I lately paid a visit to Bell's Model Dockyard in Fleet Street, where not only models of all sorts can be seen, but every part of the fittings of a vessel in miniature can be procured. Dead eyes, and blocks, and cleats, and rudders, and tillers, and steering-wheels, and binnacles, and tops, and caps—indeed, a vessel of any rig fitted for sea, down to a single block, can there be procured. I like to see a boy make everything of the sort himself, but at the same time very few boys can make anything nearly so well as those to be got at the Dockyard. A very fair mode of proceeding would be to buy one good sailing-model complete, and then to build others of various sizes from it. Four or more boys might combine to purchase a model between them, and specimens of the various parts, and then each might copy it, or make others larger or smaller, and either sell the original, or race

their own yachts, making it the prize. In the last chapter I have mentioned other places where models are to be procured, and have given some further suggestions as to the best form for model yachts.

I have no wish to induce any of my young readers to turn sailors; but if they manage to master all the subjects which they will find in the following pages, they will obtain that knowledge of nautical affairs which every well-educated Englishman ought to possess, and my labour will not then have been in vain.

I should say that I am much indebted to a work entitled "Naval Costumes," written by an old friend, the late Admiral Sir William Symonds, Surveyor of the Navy, and which I omitted to mention in the first edition.

WILLIAM H. G. KINGSTON.

BRENTWOOD, ESSEX,
*October* 1867.

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THE

# BOY'S BOOK OF BOATS.

## CHAPTER I.

THERE is a common saying that "the boy is the father of the man," and a very true one it is. I do not know whether, on the same principle, a boat can be exactly said to be the father of a ship; but I have generally found that those boys who take pleasure in making or in sailing model boats, as

they grow older wish to become sailors, or to know all about ships of every rig and description; or, if they do not enter the navy, that they get vessels of their own, and amuse themselves with the truly English and manly occupation of yachting. I speak from experience. At a very early period of my life I recollect being the owner of a little green-bottomed cutter, with which I used to sail matches against a schooner called the *Tartar*, belonging to one of my cousins who entered the navy, and whose gallant deeds on the coast of Africa I have elsewhere chronicled. I afterwards built many boats of much larger tonnage, and went on progressing till I mounted the crown-and-anchor button and gold-laced cap, as a member of one of the first yacht clubs in England, and the owner of a good-sized yacht. I have made a number of voyages, and visited different parts of the world, where I have seen a great variety of craft; and I have always read accounts of voyages in which vessels, and boats, and canoes have been described, so that I may write with some authority on the subject. I propose, therefore, to give, in the following pages, the result of my long experience in the matter of boats and vessels, so that my young readers may learn not only how to cut out or build and rig a boat, but may inform themselves about all sorts of vessels, from a fishing-smack to a line-of-battle ship, as well as about the numberless

curious canoes and other craft which are to be found in the Pacific Ocean, the Eastern seas, and other distant parts of the world.

At a very early age I manufactured a boat, one into which I could get myself, and which floated with me. I do not say that it floated very long with me, however. The framework was a large long foreign basket, shaped like a boat, and I covered it over thickly with whitey-brown paper and paste. A very creditable sort of boat I thought that I had made. I put it into a tank, and with vast delight in I got. Scarcely, however, had I begun to paddle about, when to my dismay I saw the water, as might have been expected by a more experienced navigator, gradually oozing through the thick mass of paper, and very soon I had to scramble out to save myself from a ducking, while the outside covering rapidly peeled off this my first attempt at naval architecture.

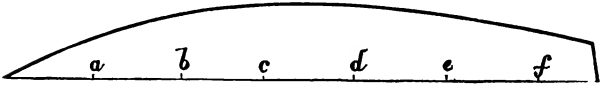
There are three ways of making models of boats or vessels fit to sail; they may properly be called the Cut-out, the Clinker, and the Carvel. The Cut-out is formed from a solid log. In the Clinker style of building thin flexible planks are used, which overlap each other; the ribs are numerous and fine, and serve rather to bind the planks together than to give the shape, and a temporary framework is put up to assist in giving the desired form. Light boats and some small vessels are

built in this way. In the Carvel style the ribs are very stout, and are set up first in the intended shape of the vessel, which, till the planks are nailed on, looks like a huge skeleton. The planks are nailed on at the last. The largest ships are built in this way, and so even are many boats where lightness is not essential. I have seen very beautiful models formed both in the latter ways as well as in the first, but a considerable amount of skill as a boat-builder is requisite to make them, especially to construct a clinker-built boat. The first boat I made was formed out of a log, and I would advise any young ship-builder who wishes to construct one of a similar character to proceed much in the following way :—

In the first place you must procure, from a timber-merchant, a piece of soft fine-grained white American pine, without a knot, or crack, or flaw of any description, and well-seasoned. A quarter out of a large log is the best; that is to say, suppose the log you require is to be ten inches wide and deep, it should be cut from a stem rather more than twenty inches in diameter.

To cut out a good-sized boat get a log three feet long and ten inches deep and wide. If you have not cut out a boat before, then I would advise you to get two or three smaller pieces on which to practise—say a foot or ten inches long and four or five inches square. With these you

can form some small models of the shape you purpose making your larger craft. First have your log perfectly square. Settle which is to be the deck. Get a sheet of brown or cartridge paper, and on it draw the shape of the deck, first like the half-deck I have given in the diagram, and then double it over, and cut it out




MODEL FOR HALF THE DECK OF A CUTTER.

so as to have both sides exactly alike. You cannot be too particular in all your measurements. Draw, with a carpenter's pencil, a line down the centre of the deck, and then one at each end of the log, with lines on either side of them to mark the thickness of the stem and stern-post. Now turn the log over, and draw the keel from one end to the other of the same thickness as the stem and stern-post. The lines, of course, should meet. Across the deck draw lines half way between *b* and *e* and *d* and *c* to mark the extreme width. Draw also a line half an inch inside the deck-line, which marks the shape of the upper part of the vessel, or what you may call the bird's-eye view. The upper part of the sides should fall inwards to this line. Now saw off the corners of the log downwards on either side of the bow

and stern. Turn the log on its side, and mark the shape of the counter as in the figure on page 8. Also the shape of the stern like fig. *f*, below. You will find that a large piece of wood may at this end also be sawed off, but take care not to cut too deep. You may also saw down on either side of the stern-post, or dead wood, and also longways to cut out the shape of the run. The stern consists of the stern-rail and counter, with the stern-post below it. Cut out the shape of the side view of the stern-rail and counter on a piece of card-board, so that you may have both sides alike. Cut out also a stern-view of the shape of the counter in card-board, and by doubling it you will have both sides alike. Tack it on to

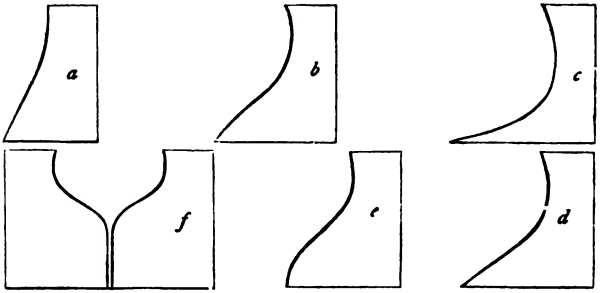
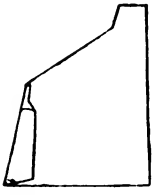



DIAGRAM OF FORMS FOR CUTTING OUT A BOAT.

*a* Form at bow.
*b* ,, between bow and extreme breadth.
*c* ,, at extreme breadth.
*d* Form between extreme breadth and stern.
*e* ,, next stern.
,, at stern.

the stern and draw the shape. I have given a collection of diagrams for cutting out the sides.

The above cuts are only to show you how to form your vessel. The shape must vary according to the class of vessel you intend to model. Mark on the deck a spot where the forms are to be placed. Thus, having got one side the shape you require, you can with your forms easily make the other side of the same shape. Draw on the after part the shape of the stern. A fine graduated-gimlet will be useful, as you may bore with it so as to mark the depth of wood you wish to cut off on either side; by measuring from the form you may easily ascertain how deep you may bore. You may cut away boldly at first, till you get the log into the rough shape of the boat, but afterwards you must shave very carefully, with the left hand pressed on the blade of the chisel or gouge. I have known some boys whose eyes were so correct that they have cut out boats, trusting to them alone, without any moulds. But I strongly advise the use of moulds, as you may thus draw your plans in a scientific way, and duly consider the form likely to sail well. Besides, with the same forms you may cut out several vessels, with any alterations which your experience may suggest. I used to find it difficult to give a pretty stern,—for that you can also make a mould thus—



FORM OF STERN, ETC.

Remember that I do not give these moulds as models to be followed exactly, but merely to show you clearly the plan I advise you to adopt. You must look at models of boats, or at yachts, or other vessels, when hauled up on slips, or in dry docks, or when building, and form your own moulds from them.

My plan is to cut out one side by the eye, and then in cardboard or thin wood to cut out the shape, and to apply it to the opposite side. A correct eye will, however, enable you to dispense with these last-mentioned side moulds. The great point is to know what you want cut out. The shape of the vessel must be in your head—just as the statue is in that of the sculptor's—before you begin to work. You must study well beforehand the shape of yachts, or models of yachts, or you must have a model before you. The best way is to borrow a model, and to work from it. You may modify the shape according to circumstances.

With a model before you, the descriptions I am giving may be of much service. Cut out completely the shape of the vessel before you begin to scoop out. You cannot get on without a carpenter's bench and vice, in which you may fix your log. You require a hand-saw, a tenon-saw, three or four chisels—one of which must be large—three gouges, a good spokeshave, a set of gimlets and bradawls, a wood rasp, a file, hammer, pincers, and screw-driver. You will find that you can cut out much faster with a gouge than with a chisel, though you can afterwards smooth down with the chisel. The spokeshave is especially useful in smoothing off the sides and rounding the bows. Indeed, you will do more work with that and a gouge than with a chisel. Get your tools well sharpened by a carpenter, and remember, in using them, cut on straight ahead with them, but never attempt to wrench the wood off or you will break the edges. I have just finished a cutter, three feet long by ten inches wide, and, including bulwarks and keel, thirteen deep, and I thus give you the benefit of my experience. The upper works should fall in slightly. To make them do so, draw a line about an inch and a half from the deck right round the side. From this shave off, with the spokeshave, about an eighth of an inch of the deck from the broadest part of the bow to the

stern; but not from the bow itself, which should be straight. Give sharp bows without any hollow, a good floor, that is, width under the broader part of the vessel, and a clear sharp run aft. When you are satisfied with the shape of your vessel, but not before, begin to scoop out. Leave a good half-inch thickness for the sides. Mark round the whole of the inside with your gouge, gradually deepening the mark, and working from the edge. Leave an inch or more at the bottom. Having scooped out the craft, get a clean plank half an inch thick for the deck. Mark it out by turning the vessel over on it. Screw it on slightly in the rough, and finish it when screwed on, so that it may fit exactly. Thus you will understand that the deck is the full width of the vessel, and screwed on above the sides. Do not fix it permanently until you have cut out the holes for the mast, the bits, the rudder post, and the hatchway. Cut steps, for the mast and bits, in the bottom—that is to say, small holes about a quarter of an inch deep. Place three troughs or shallow boxes, with tops, in the bottom, from the step of the mast aft, in which to put leaden ballast to trim the vessel.

Walnut is an excellent wood for the stem and stern post, and keel. These may now be fastened on with screws. Use screws for every part of the vessel. Fit racks on either side to hold four

or five belaying pins each. First take a piece of walnut three inches long and one high, and on to the upper edge screw a shelf half an inch wide. Thin screws, with the heads filed round, make good belaying pins, as they cannot slip out. Screw this rack into the side of the deck. The bits should be made of walnut. They consist of two pieces going right down to the bottom of the vessel, through the deck, above which they rise, a cross piece being fixed to them, which secures the heel of the bowsprit, and at the same time serves for belaying ropes to. The bulwarks may consist of thin laths, about two inches deep, of elm, or fir, or walnut—the last is the best. Fix them on with screws to the side and deck, and to the stern. Remember that the stem must rise about two inches above the deck. You may take one long lath and bend it all round. This you may do by holding it over steam from boiling water. Or you may cut a stern rail out of walnut-wood, screw it on, and fix the ends of the bulwarks to it.

The main hatchway should be made like a skylight, and painted accordingly. You can make a sham companion hatch aft, and a fore-hatch forward; but the fewer holes you have in the deck to stop up the better. The chains, made of walnut, are about three inches long, and rather more than half an inch wide. Fasten the dead-

eyes with chain-plates of fine copper wire to screws. Four turns will secure them.

A long thin cane, nailed on just under the bulwarks, will form a very pretty set-off. Another on the top has also a good effect. Use a fine bradawl and fine brads. Use the bradawl very gently, or the cane may split.

Before putting on the bulwarks secure the leaden keel. That should contain four or five pounds of lead. Cut a groove about an inch deep in a thick plank. Run thin nails up it all along, and grease them. Provide yourself with an iron ladle, such as plumbers use, in which you must place your lead over a fierce fire until it is perfectly liquid, then very carefully pour it into the groove. The nails will make the required screw-holes in the lead, and save the trouble of boring. Fasten it on with long screws, which first grease. Now go over the whole outside with glass and sand paper, and the whole of your craft is complete.

Before putting on the bulwarks screw on a bar of stout wire just before the mast, from side to side, rising just high enough to let the bowsprit pass under it. Get a hole made at each end, which must be flattened, for a small screw. Before you fasten it down put a small stout ring on it. This is called a horse, and the foresheet traverses on it. Get some small brass screws with eyes. Screw a

strong one aft for the main sheet, two on each side for the back stays, and one at each side in the broad part of the bows for the bowsprit shrouds. For the rudder you will require a rudder case. A pop-gun makes a tolerable one. Fit it carefully, so that the water may not get in. The rudder may be made of walnut, of one piece: it requires skill to hang it properly. Two small brass eyes, to be got from the ironmonger's, must be fixed in the stern post, one below the other, and the pintles, which go into the rudder, can be made of stout iron wire. The rudder need not be more than two inches wide. The inner edge of the rudder and the stern post must be rounded off to allow of the rudder acting properly.

I will not attempt to describe how to build a carvel or clinker boat, because a person must have a good deal of practical experience to make the attempt. I however lately designed two styles of models which I think will be found easy to build. First, I place a keel, then what I will call a cross piece—this is a thick board running the length of the broad part of the vessel, and above it I would screw on the kelson. Now, instead of making ribs and cross-beams for the deck, I take boards of soft light deal, and cut them out in the shape of the different sections of the vessel. A sheet of brown paper will enable me to cut the sides exact. Screw them into the keelson, and strengthen them with stays.

Yet further to strengthen them, I screw on a deck of one piece, with the necessary holes cut in it for hatchway, masts, &c. I have now a framework which I can cover with fir or elm planking, or with sheets of zinc or copper. The latter is the most easy to use, as it is very malleable, but it is liable to become dented. Wood is the best. Get a carpenter to cut out a supply of broad laths about the eighth of an inch thick. Use small screws. Steam the planks well and they will bend easily. Such a structure may afterwards be covered with a sheet of thin copper, which will add to its strength and appearance.

You may now proceed to prepare your rigging. My object is to enable you to fit out a vessel which will not only look pretty, but which will really make her way on a given course across a pond or lake. She should be like a real vessel, with certain modifications, because, in the case of a real vessel, the hands to guide her and work the sails go on board, and in that of a model they remain on shore. The ropes and masts and spars must be thicker in proportion to the size of the craft than in a real vessel, and the blocks must be stronger and larger; still, all the work must be as neat and exact as you can make it. The first considerations are the masts, bowsprit, and other spars. They should be of ash, or, if of fir, use the best white pine, and select only what has a very straight

grain; so that, if you were to attempt to split it at one end, you might divide it longitudinally in two parts. The masts, bowsprit, and yards are known generally as spars. If you can get them turned, they will be more exact than you can otherwise make them. If not, having cut them with your knife nearly to the required thickness, use a wood-rasp, and then polish them off with sand paper. For the rigging use whipcord well stretched for the thicker ropes, and there is a fine line sold for fishing-lines which answers very well for running rigging. However, the best plan is to get what is called water line of several degrees of thickness, try how they stand being wetted and again dried.*

If they run evenly, do not shrink or fray out, and are strong, they will answer your purpose. It is well to have them of different tints, from white to dark brown, and of different degrees of thickness, so that you may more easily distinguish the various ropes.

Blocks are next to be considered: they should be made of boxwood. You can buy them ready-made with sheaves and brass pins—perfect little model blocks. If you have patience you may make them yourself in the same way; but to make them neatly you must expend a great deal of time, and, after all, you cannot make them as

* There is a good rope-shop near the Monument.

well as the blocks you can buy, which are, I fancy, made with the aid of machinery. You may, however, make very neat little blocks, which will answer every purpose and look perfectly well, although they have no sheaves. Cut out of a small lump of boxwood the shape of a block, drill a hole on the narrow side through the thickest part, hold it in a vice, and with a very small chisel cut out what will appear like the round of a sheave. The best plan, however, is to take a long strip of boxwood, the thickness of the intended block one way, and the diameter, or what is called the size of the block, the other; mark it off into lengths for blocks. With a small pair of compasses mark off on the flat side the size of the sheaves, so that you may know exactly where to drill the holes. This score marks the score in each of the separate blocks in which the straps are to be placed. After you have drilled the holes make a long score with a saw on both sides. Saw the blocks about half apart, and then with your knife cut out each block as nearly as possible to its proper shape. Then saw them completely apart, and finish off with a file. In this way you may make a dozen blocks at a time very fast. For double blocks the strip of wood must be thicker, and two holes are required. The dead eyes may be cut out in the same way. A dead eye is a block of wood with a groove round it for the shroud to lie in, and three holes

for the lanyards of the shrouds to reeve through; it may be made of box or any hard wood which does not easily split. The lower dead eyes are fixed by bands of iron (or you may make them of copper wire) called chain-plates to the chains. The lower ends are bolted into the sides of the vessel under the chains. For the running rigging you will require ledges of wood fixed inside the bulwarks, just abreast of the masts, with brass pins running through them; these are called Pin-racks. The pins are belaying-pins, and are fastening or "belaying," as the term is, the running rigging. The mainsail of a fore-and-aft vessel is fastened to the mast by small hoops. They must be neatly made of strips of willow or other wood which can easily be bent and whipped round with fine twine. They must slip with perfect freedom up and down the mast; or small brass rings will answer the purpose.

We may now talk of rigging our vessel. We will suppose that she is a cutter. Our mast is about a quarter as long again as the vessel, or perhaps longer. The lower part under the deck is squared to fit into the step. At the upper end we fix our crosstrees, a short way from the top. They are formed of a thin bar of iron fixed to the cap, with holes at the ends for the topmost shrouds to pass through. They rest on cheeks bolted to the side of the mast. The whole of the upper end of the mast of a cutter is now rounded, and at the

extreme upper end a cap is fixed on. The cap serves to hold the topmast; the lower part of which is squared, and is called its heel, fits into the crosstrees. There is a hole through it, into which an iron pin fits, called the fid, to prevent its slipping through. When it is necessary to strike the topmast, the fid is taken out and the mast descends at the fore side of the lower mast. As soon as the mast is stepped, the crosstrees are fixed on. The shrouds, forestay, and backstays come next. They are made with loops, or eyes, at both ends. The eyes must be spliced in, and then neatly whipped over and tarred. The shrouds fit over the head of the mast, above the crosstrees, and come down between its arms. The backstays go over next, and the forestay next. They lead aft, so as to prevent the masts bending forward. A backstay is in two parts; the upper part, about two-parts of its length, is thick, and is called a runner. At the lower end is a tackle, so that the stay may be set up or slacked off, as required. The lower part of the forestay leads to the stem, to which it is secured by a lanyard.

At the lower part of the shrouds are the deadeyes, which are brought down to the deadeyes in the chains by lanyards. A cutter has generally three shrouds on either side, which, with the backstays and forestays, afford all the support the lower mast requires. The topmast is supported by two

shrouds, which lead through holes in the end of the crosstrees, and thence down to the chains; the fore-topmast stay leads to the end of the bowsprit. These ropes I have mentioned form what is called the standing-rigging, because they are fixed, or intended to stand, that is, remain. The ropes which move the sails or yards compose what is called the running-rigging, or what runs through blocks. The cross-trees for a cutter may be made with a cap and a light bar of wood or iron across it, to stretch out the topmast shrouds.

The spars required for a cutter are few. The chief are the bowsprit and the mainboom, then the gaff, the gaff-topsail yard, the squaresail yard, the squaresail boom, and sometimes a square topsail yard.

The bowsprit is often nearly two-thirds the length of the vessel, and more than half as stout as the mast, is made to run in and out, and is secured at the head by a fid, which passes through it and the bits. It is supported by stays on either side, which are set up with tackles, by a bobstay which leads from its end down to the stem at the water-line, or lower, and is also set up with a tackle. These stays are the standing rigging of the bowsprit. On the bowsprit a ring should be placed with a hook to it; this ring is called a traveller. The outer clue of the jib is hooked on to it, and it is thus hauled out by means of a sheave at the

end of the bowsprit to the end, and the jib is then stopped along the bowsprit ready for hoisting. A rope leads from the traveller in board to haul in the jib when it has to be taken in; an iron ring is fixed in the stem for the bowsprit to run through. The bowsprit should be well scraped and greased, to allow the traveller to work easily.

The mainboom in a cutter should be only somewhat slighter than the bowsprit. It must be long enough to extend some distance over the taffrail; the end which presses against the mast is formed with jaws in a half-moon shape; it is secured to the mast by a line, which has little wooden balls on it, thus enabling it to move without friction. The chief rope attached to it is called the main-sheet, to haul it in or to let it out; there is another, the topping-lift, which leads from the extreme end to the masthead, and lifts up the boom or allows it to sink down. The jaws should be made of some hard wood, and secured well to the boom with a band of copper or iron, or the boom may be whipped round with twine. A chock, or block of wood, must be fastened to the mast to prevent the boom from slipping down. At the end a sheave is fixed on at the side, by which to haul out the outer clue of the sail, and there are other sheaves at intervals, by which the leech of the sail is hauled down when reefing; the boom, when the sail is furled, rests on a crutch placed at the taffrail.

The gaff has jaws like the boom, but is much slighter. It has a sheave at the outer end, to which the outer clue of the sail is hauled out, and a small block for the ensign halliards. A second sheave is also required for the gaff-topsail-sheets; generally two blocks are strapped on through which the peak-halliards reeve. At the upper end of the jaws there is an eye, to which the gaff, or, as they are called the throat-halliards, are secured. On the topmast is a ring with a hook, which is hauled up and down by means of halliards, passing through a block or sheave at the topmast-head. Often, however, the gaff-topsail is set flying; in that case, there are simply the halliards which lead down on deck. One end is then secured to the yard, and at the same time the topsail-sheet is fastened to the outer clue, and both are hoisted together. To the sail is attached a down-haul, which serves to keep the lower clue of the sail down tight. The foresail is fastened to the forestay by a lacing. The sheet traverses on an iron bar, called the horse, running from side to side of the deck, before the mast, with a slight curve, the convex part uppermost. There is a ring on the bar, to which the inner clue of the sail, in which is a copper thimble, is secured by a lanyard. The outer clue of the sail is also secured to the stem by the lanyard. It hoists to a block placed just under the crosstrees; there is another block

higher up for the jib. The mainsail and foresail are kept bent at all times when the vessel is ready for sea, but the other sails are stowed away. The jib, however, is stopped along the bowsprit when the vessel is getting ready for sailing. The square-sail-boom may be kept bent, that is in its place, as it sets off a vessel very much. It has braces and topping-lifts and stays. The sail is generally bent to the yard, which has also braces and topping-lifts. The jib requires a light rope for a downhaul.

The gaff-topsail has also a light rope leading from the outer clue to the topmast head, through a small block, so that the clue of the sail may be hauled up if it is necessary, to take off the pressure of the sail. It may be called a brail.

These ropes, halliards, sheets, lifts, and braces, constitute what is called the running rigging.

All ropes, it should be remembered, must be whipped at the end. In a real vessel they would be pointed. Lastly, we come to the sails. They should be linen, cut very carefully, and worked from the top to the bottom to represent the cloths in a sail, that is, the breadth of cloth of which it is composed. The edges are called leeches, the inner should be roped, with little rings let in at each corner, called cringles.

In the outer leech there should be four at the end of each line of reef points. Their use is to

have a rope called an earing passed through them, to bring the leech of the sail down to the boom when the sail is furled. The reef-points are small pieces of line let into the sail, and secured with a knot at each side of the sail. An additional cloth across the sail is sewed on where the reef-points pass through, to strengthen the sail. Long cloth answers well for a model sail, provided it is first shrunk; linen is better. The foresail should be made of the same, and the storm and ordinary jibs, but the balloon-jib and the gaff-topsail and flying-jib may be made of lighter stuff. The ropes which go round a sail are called bolt-ropes. All the sails should have bolt-ropes. A sail should be made to stand, that is stretched out, as flat as a board.

It will look pretty well if the sails are marked down with permanent ink, but it looks better for the larger sails to have the cloths marked out by a very small stitch with black thread. The foresail is a triangular sail, fitting between the forestay, the mast, and the deck. It exercises a powerful influence on the forepart of the vessel, especially when she is going about. It has reef-points, so that it may be reefed; so has the jib, that it may be reefed when the wind is not quite strong enough to make a second or storm-jib necessary.

You will find a diagram further on with a list of the chief sails and spars, &c. of a cutter.

In cutting a jib the inner leech and foot are rounded, and this gives a very pretty appearance to a sail.

Before you can attempt to sail a real boat, or even a model one, you should learn how to knot and splice. Knotting is making all sorts of knots or ties. Splicing is joining two ropes together by unlaying them and intertwining their strands, or by twining the end of a rope into itself by opening the strands, so as to form a loop or eye. The most important is the reef-knot, by which two ends of a rope are fastened together. Each end is held in a hand, and they are turned once round each other. They are then turned once more one within the other. The rule to be observed is, that the end which is uppermost of the two as it comes out, is still the uppermost before the second turn is made. If this is not done, the knot is a granny's knot, and is sure to slip. For knotting, however, you especially require practical instruction, and all that an author can do is to refresh your memory, or to make you understand more clearly what you have before seen.

The above remarks are intended merely as hints to assist you in making a working-model. The proper measurements, both of hull, masts, and spars, standing and running rigging, and sails, you must take from the following chapters, where I describe the various classes of vessels and the mode

of building and rigging them. It will be well to give the last coat of paint to your vessel after you have fitted your rigging. A bright copper-colour, avoiding too red a tint, looks well for the bottom ; the upper part black, and the inside a straw or salmon-colour, with lines of red here and there. A little gilding has a pretty effect. When sailing a model-vessel, you will have to guide her entirely by her sails and the way you ballast her. I used to unship the rudder as it is practically of no use, unless you could teach a mouse or a water-rat to stay on board and steer. Before you can sail a model properly, so as to direct her to any particular spot, you must understand the theory of sailing, and in the following pages I hope to give you some instruction on that subject. What an amount of labour, of thought, of consideration is required before a vessel is ready for sea !

First, the oak, or the fir, or the teak, and other woods, have to be cut down in their native forests, and brought to the sea-side to be seasoned. This process is performed by allowing it to soak in salt water for a year or more ; it is then handed over by the timber-merchant to the practical shipbuilder. The naval architect has, meantime, drawn out his plan on paper, called the drawing or draft of a ship, which I am about to explain to you. From this the builder forms the keel,

and shapes out the ribs, the stern, and numerous other parts. Sometimes all the ribs are cut out before even the keel is laid down, or any are set up. After the ribs are set up, the ship is planked, and the deck laid down, and then the caulkers come on, who stop up all the interstices between the planks with oakum. Ships' carpenters and joiners next fit her up inside. Mast and spar-makers now prepare the masts and spars, and with sheers step the masts.

Rope-makers have made the ropes, and now riggers come on board and fit and set up the standing and running rigging. Sometimes the crew do this, but often a ship is ready for sea before the crew come on board. Blacksmiths have had all this time a great deal of work to do, both in making bolts of iron and copper to fasten the ribs and other parts together, and often in making iron knees and stanchions; as also hoops for the masts, and numerous other things about the deck, and for the spars, &c. Copper-smiths make water-tanks, and coopers casks for provisions. The hold has to be stored by dockyard labourers, with numberless stores. In ships of war guns have to be manufactured, and gunpowder, and shot. Sailmakers have been making the sails, by sewing with twine, cloths, or what linendrapers might call breadths, of canvas together. These, last of all, are bent to their respective yards. Officers have, in the meantime,

been engaging the crew, and now the ship is ready for sea. Two separate sciences must be understood by the officers to direct the ship. One is seamanship: this is the science of managing the sails so as to make her go in any direction required; to know what amount of sail to carry, and what manœuvres to try under all circumstances in which she may be placed. Navigation, the other science I speak of, is the art of taking observations, by means of instruments, of the sun, or moon, or stars, in conjunction with chronometers, which are clocks made to go with very great exactness, so that the real time at any particular place can be known. By navigation the precise position of the ship can be ascertained, and the proper course for her to sail on can be given. A man may be a very good seaman who knows nothing of navigation, as many able seamen are, but he is unfit to be an officer. A man who has never been to sea may be a first-rate navigator, but he is unfit to take command of a ship. There is a third science very requisite for all officers; that is, the science of commanding others. In the royal navy the science of gunnery is required; and at the present day it is brought to great perfection. On board ships where steam-power is introduced, the officers should understand the steam-engine thoroughly. A new class of officers and men are required in them also. The first is called the chief engineer, and he

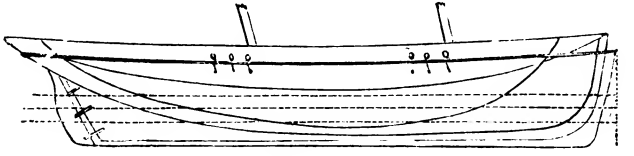
has several mates; there is a crew, also, of engineers and stokers. Large ships have also pursers or paymasters, (who pay the crew, and take care of the stores,) chaplains, and surgeons. From the slight sketch I have given, it will be seen how much space the full description of even a single ship would occupy; an idea may therefore be formed of the great variety of points to be touched on relating to the subject of boats and ships, not only of those built in England, but of the great variety to be found in different parts of the world.

## CHAPTER II.

### SHIP-BUILDING.

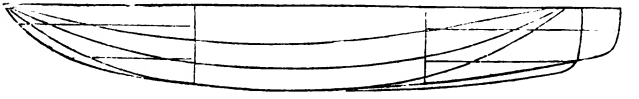
BEFORE a ship can be built it is necessary to make a drawing. This is called the Sheer Drawing. It consists of three parts dependent on each other. They are the Sheer Plan, the Half-breadth Plan, and the Body Plan.

The Sheer Plan describes the longest and deepest longitudinal section of the proposed ship. On this plan the position as to height and length of any point may be ascertained.



SHEER PLAN OF SHIP.

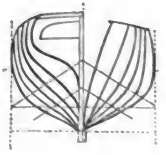
The Half-breadth Plan describes half of the widest and longest level section in the ship. On



HALF-BREADTH PLAN.

this plan the positions of any point, as to width and length, may be ascertained by projection.

The Body Plan describes the largest vertical or athwart-ship section of the proposed vessel. All the other sections are accordingly drawn within it. In this plan the height and width of any point can be ascertained by projection.



BODY PLAN.

By means of these three plans the length, breadth, and depth of every part of the proposed vessel can be drawn on paper, and at once ascertained.

I said that they mutually depended on each other. Thus, the Sheer Plan gives the height and length, and the Half-breadth gives the breadth and length; thus the length is common to the two.

Again, the Sheer Plan gives the length and height, and the Body Plan gives the breadth and height; here the length is common to the two. Lastly, the Half-breadth gives the length and breadth, and the Body Plan gives the height and breadth; in this the breadth is common to the two.

These three plans serve for the projection or drawings of boats or vessels of any size.

You will, after some practice and consideration, be able by means of them to draw the shape of any model vessel you may wish to make, and from your drawing form the different moulds you may think necessary. You will find it useful to study and clearly comprehend the plans I have given, for though you may not follow them exactly, they will assist you in drawing any you may fancy. I will give you the dimensions of various vessels, that you may cut out or build your models in the same proportions.

The plans being drawn, the ship-builder sets to work and lays down what are called blocks. These are thick lumps of wood placed in a long line, four of them in each pile, one upon another. On these blocks the keel, formed generally of elm, is placed. The keel in a large ship is composed of several pieces. The foremost piece curves up, and is joined to the stem by what is called a scarf. The groove formed in the keel to receive the lowest planks is called a rabbet. These planks are called garboard-strakes, and are generally very thick.

A FALSE KEEL is fastened on below the real keel, to which the ribs are fixed. This false keel, formed of elm, should the ship take the ground, may be easily knocked away without injuring her.

THE STEM is the foremost end of the ship; it is composed of oak. It is, in reality, a continuation of the keel rising up to the height of the vessel. In large ships it is formed of three pieces: a groove is worked in it to receive the end of the plank.

THE STERN-POST is the continuation of the keel to the height of the deck, and has also a rabbet in it to receive the butt ends of the planks.

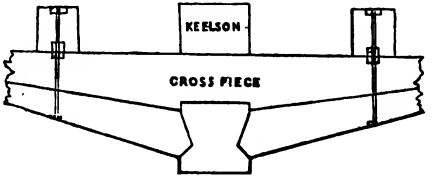
THE FRAME, OR RIBS.—The frame, as I have said, when set up, looks like a huge skeleton. It consists of a great number of pieces of timber. They are called either floors, half-floors, cross-pieces, first, second, third, fourth, and fifth futtocks, floors short and long armed, and top timbers. Then I will describe—

FLOORS.—This portion of the frame has a middle seating, on the keel. Thus, the floor-arms of the floor-timber extend to an equal distance on each side of the keel. Some extend further than others, so that all the points of union may not be on the same line. The different FUTTOCKS are the different pieces of timber which form a rib, firmly joined one above the other. The upper piece of timber which completes a rib is called the top timber. The opposite ribs, united by the half-floors at the keel and keelson constitute a FRAME. The open spaces between the frames are called ROOM AND SPACE; they vary from two feet six inches to three feet nine inches. At present,

generally in the Royal Navy, the entire room and space, to a certain distance above the keel, is filled up and made water-tight, so that, should even the external planking of the bottom be stripped off, the ship may swim. The materials used, which should be well-seasoned wood thoroughly caulked inside and out, are called FILLINGS, and sometimes extend as high as the load-line, or line of supposed deepest immersion.

THE KEELSON is an inner keel. The object of it is to strengthen the vessel lengthways, and to confine the floors in their proper positions. It is placed above the crosspieces and half-floors, and a bolt is driven right through all into the main keel. The half-floors, it must be understood, are not united in the centre, but alternately on either side.

The following sketch will show the arrangement by which these important timbers are firmly united into one mass.




Sometimes long timbers are employed called SIDE RIBBONS. They run down on either side of the main-mast to receive the step of that mast.

The ribs being set up at the height of the under side of the beams,—an inside hoop, it may be called,—a thick rib of wood is fixed longitudinally the whole length of the vessel for the purpose of receiving the ends of the beams which support the decks. It is called the SHELF, and is bolted into the timber of the frame.

The DEAD WOOD is the solid timber rising from the keel at the fore and after part of the ship. The ribs, it will be seen, become more and more in shape like a V, till they at the lower part close altogether. The rabbet cut in the keel rises up the dead wood, and forms the BEARDING LINE. The APRON is part of the dead wood forward. It is a thick piece of timber, and its object is to afford wood to secure the plank at the bottom and the heels of the foremost timbers. The STEMSON is another timber used as a further support to the stem. Beyond the stem is a mass of wood called the KNEE OF THE HEAD. At the upper part stands the figure-head. It also forms a base to receive the GAMMONING of the bowsprit. The lowest part of the stem is called the gripe. When a ship keeps well up to the wind, she is consequently said to have a good GRIPE of the water.

What the rafters are to a house, so are the BEAMS to a ship to support the floors or decks. The beams are placed across the ship, and rest on the shelf. The beams, however, do not tie the

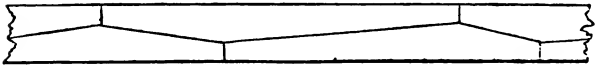
sides of the ship, or prevent them from falling out; they have, when the weight of guns is placed on them, a direct contrary effect, and have a tendency to force them outwards. Above the beams another hoop or riband is secured longitudinally round the ship on the inside. These are known as WATERWAYS.

The two sides of the ship are united, when the lower timbers do not cross the keel by timbers, with arms, those foremost being called BREADTH HOOKS, the after ones CRUTCHES.

Before the beams are crossed the form of the ship is preserved by long pieces of plank called CROSS PAULS. They have the breadth of the ship marked on them. The keelson has also the centre of the ship marked on it, and a plummet dropped from the centre of the cross paul should reach exactly to the centre line on the keelson. If not, the shores on one side should be slackened and driven up on the other till it does so, and the proper shape of the ship is restored.

The PLANKING of the ship, or, as I have heard it most facetiously called, putting the skin on the skeleton, is a very important and no very easy matter. The planks are of different thicknesses and different materials in different parts of the ship. They are secured to the timbers by TREENAILS, or bolts of copper or iron; the latter being eight times as heavy as the wood taken out, add

much to the weight, and easily draw. Wooden trenails are altogether considered by many as the best means of fastening. The outside planking is known under the heads of Wales or Bends, Diminishing Plank, Plank of the Bottom, and Garboard Strakes. The planks are not all even, but as the planks partake of the form of the tree, and are narrower at one end than at the other, for economy's sake they are worked top and butt, so, however, as to make up a constant breadth in two layers.



The wales or upper planks are the thickest, and are nearly twice as thick as those below. The planking below the wales has gradually to be diminished in thickness till it reaches the plank of the bottom. This extends to within five or six strakes of the keel. These latter are termed the GARBOARD strakes. Oak, fir, and elm are used for the planking. We must next consider the inside planking. That immediately under the shelf of each deck is called the CLAMPS; that over the waterways is called the SPIRKETTING. Above it the lower rim of the port is called the LOWER CILL of the port; the upper rim is called the UPPER CILL.

The beams being placed across, we come to the framing of the deck—that is, marking out the hatchways, mast-holes, &c. The framing of the MAST-HOLES are composed of FORE AND AFT PARTNERS, CROSS PARTNERS, and CORNER CHEEKS.

The HATCHWAYS are formed of four pieces: two placed fore and aft are called COAMINGS; those athwartships are denominated HEAD LEDGES,—the latter rest on the beams. Coamings have pieces of wood placed under them reaching from beam to beam, called CARLINGS. The coamings have a rabbet taken out of them to receive the gratings. The LADDER WAYS and SKYLIGHTS are fitted in the same manner.

RIDING BITTS are pieces of timber passing through two decks, placed forward, by which to secure the cable when the vessel is riding by her anchor. Two-deck and larger ships have two sets of riding-bitts; flush-deck vessels have only one set.

The sides of ships of war above water have apertures called PORTS, through which the guns are run out; they are from seven feet to nine feet apart. They are closed by PORT-LIDS with hinges, to lift up and down; some are of two pieces, but others are of one.

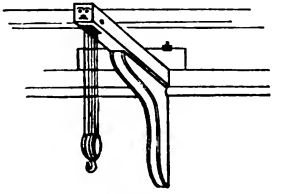
The upper sides of the ship are called the ROUGH TREENAILS. Above them are the HAMMOCK-NETTINGS—a framework, or box, in which the seamen's hammocks are stowed. In action,

these, when full of hammocks, form a useful shelter to the crew against the enemy's musketry. Sometimes the stanchions or sides are of iron, others of wood, or wood and iron. The hammocks are covered up by painted canvas, called HAMMOCK-CLOTHS.

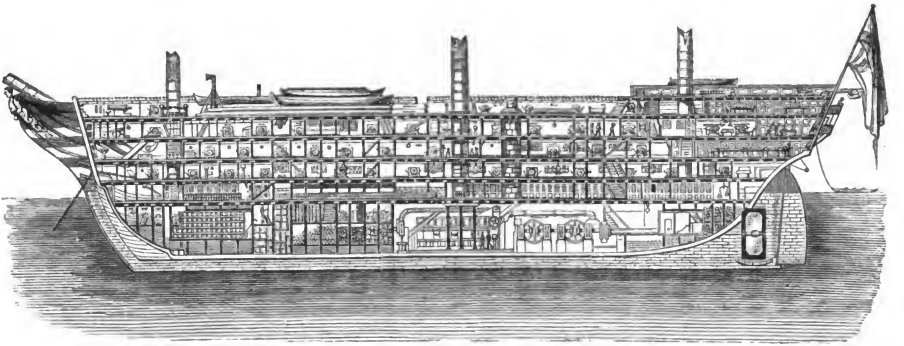
The CHANNELS are blocks of wood bolted outside the ship, to serve as outriggers and supports for the lower mast shrouds. In men-of-war their breadth is governed so that they may carry the shroud six inches clear of the hammock-rail.

The CHAIN PLATES are formed of links, or bars of iron; and their ends being fixed into the sides under the channels, they secure the shrouds to the sides.

The CATHEAD, a timber with sheaves in the extremity, projects from the fore part of the ship for the purpose of raising the anchor. At the bows is also another block of wood, or iron outrigger, called a BOOMKIN, through which the foretack passes. Various sheaves also are placed in the side of the ship through which the different sheets are passed.



CATHEAD.



SECTION OF FIRST-RATE MAN-OF-WAR.

Besides the CATHEAD, which has a cathook to it, there is another outrigger, called a FISH DAVIT, in order to raise the flukes against the side of the vessel. This is called FISHING IT. When hanging up and down from the cathead, it is said to be at a COCK-BILL.

Outside the ship are long pieces of curved wood or iron, called DAVITS, for hoisting up and securing the boats.

In the waist, between the fore and main-masts, are the SKID-BEAMS, on which the launch and pinnaces are secured.

The holes in the bows at the forecastle through which the sheets pass are called FAIR-LEADERS.

The shelves of wood, with sheaves or pins in them, at the sides, or round the masts, by which to secure the ropes of the running-rigging, are called PIN-RACKS.

We now come to the internal fittings of a ship. These vary very much according to her size and objects. In ordinary merchantmen, or passenger vessels, there is the upper or main-deck, the between-decks, or 'tween decks, and the hold.

The UPPER DECK is so called by shipwrights because it receives the entire upper line of guns of the ship, they extending fore and aft through her entire length. Seamen call it the MAIN DECK, because formerly all the ropes led to it, and it was

the *main* point where the greatest activity was displayed.

I will now give you a sectional division of a first-rate line-of-battle ship. Such a ship, carrying 120 or more guns, has four decks on which her guns are placed. The highest is open to the air,—that is to say, it has no deck over it, and is called the UPPER DECK: I should have said that it has no deck over the greater part of it. At the after part, extending a little way beyond the mizen-mast, there is a raised platform, called the POOP. It has no guns on it. On the main deck, just before the fore part of the poop, and thus under shelter, is the steering-wheel, with the binnacle in front of it. The after part of this deck between the poop and the main-mast is called the quarter-deck, and is the place where the officers especially walk. The captain takes the starboard side; or at sea, when the ship is on a wind, the weather side. The part under the poop is divided into cabins, appropriated to the use of the captain. Here, also, is a clerk's office and a pantry. Between the main and fore-mast the large boats are stowed, and on either side are the gangways at which sentries are stationed. The next deck under this is called the MAIN DECK. In the after part is the admiral's cabin. Immediately under the boats is a pen for the officers' live-stock;

and just abaft the fore-mast is the galley, or kitchen.

The third deck from the upper is called the MIDDLE DECK. The after part is fitted up for the lieutenants, chaplain, surgeon, paymaster, marine officers, &c., and called the WARD-ROOM. In the fore part of the deck is placed what is called the sick-bay, a compartment fitted up as a hospital; about the centre of this deck is one of the capstans.

The fourth from the upper is called the LOWER or GUN DECK. In the after part is the GUN-ROOM, where the midshipmen, and other junior officers, mess. The tiller of the rudder works through the gun-room just above their heads. A second capstan is placed on this deck; and forward are the riding-bitts for securing the cables. It is the lowest deck on which guns are carried.

The ORLOP DECK is the fifth deck from the upper. It has no guns or ports, though lighted up by bull's eyes or scuttles. In the after part is the purser's issue-room; next to it is the after cockpit, where the midshipmen and other junior officers sleep in hammocks. Before it again will be found the sail-room, where the sails are kept, and the cable-tiers, where the cables are stowed. Before it again, just abaft the fore-mast, is the fore cockpit, and the warrant officers' cabins, while right in the head of the ship are the carpenter's and boat-

swain's stores. Low as we have got, we have still further to go down to the HOLD, which, if it may be so called, is the sixth deck from the highest. It is often divided into two decks for the greater convenience of stowage. Here are the FORE AND AFTER MAGAZINES, WATER TANKS, WINE AND SPIRIT ROOM, CHAIN CABLE LOCKERS, SHOT LOCKERS, BREAD ROOM, SHELL ROOM, GUNNER'S STORE ROOM, DRY PROVISION, and BEEF AND PORK IN CASKS.

Since the introduction of auxiliary steam-power into ships of war, a large portion of the hold is devoted to the steam-engine and boilers, coal bunkers, and the shaft of the screw, while the funnel runs up through all the decks; but it is wonderful, comparatively, how little space these are allowed to occupy, considering the great aid the steam-engine affords to the movements of the ship.

In speaking of the outside of the ship, I might have mentioned the galleries, like balconies, which run round the stern, and afford a walk to the admiral and captain. I will now give you a slight sketch of the stern of a frigate. The upper part is the TAFFRAIL, to be found in all vessels.

The lower part is the BUTTOCK PLANKING. Above it is the COUNTER, furnished with the UPPER AND LOWER COUNTER RAIL.

The windows belong to the captain's cabin;

they are fitted with sashes, like those on shore, and have shutters, called DEAD LIGHTS, which are closed in bad weather. A frigate has only one deck with a complete battery of guns, called the main or gun-deck, and an upper deck, without any deck above it, called the upper deck.

Over the stern of every ship is hung a life-buoy of a peculiar construction, with a port-fire fixed in it. There are two springs with lines; on pulling one the life-buoy falls, and on pulling both the port-fire is ignited, and burns at night to show its position to the seaman who has fallen overboard. This was invented by Lieutenant Cook, of the Royal Navy.

A flush-deck vessel, such as a corvette, a sloop of war, or a brig, has only the one deck open to the sky with any guns on it. This class of vessels have, however, poops and topgallant forecastles. The latter are small raised platforms forward. Merchantmen have generally both poops and topgallant forecastles. The crew are generally berthed under the latter, while the captain and chief passengers' cabins are under the poop deck.

Having now given you a tolerably full account of the mode in which ships are built, and their hulls fitted up, I will, in the next chapter, describe their rigging and sails.

## CHAPTER III.

### RIGGING OF A SHIP.

HAVING built our ship, the next thing to be done is to rig her. We must get our masts and spars made, our blocks turned, and our rigging cut and fitted. We will begin by fitting the rigging, supposing that we know the exact length of our masts and spars, size of vessel, &c. &c. Before, however, we can fit the rigging, a considerable amount of elementary knowledge is necessary. The chief of this is the art of knotting and splicing, about which I will proceed to give you some instruction. You must, however, first understand some of the terms relating to rigging. STANDING RIGGING consists of those stout ropes employed to support the masts and bowsprit; it remains in a fixed position. The shrouds, stays, and backstays are part of the standing rigging. The rigging belonging especially to the lower mast is called the LOWER RIGGING. The stays, backstays, and shrouds attached to the topmast are called the TOPMAST RIGGING. The RUNNING RIGGING consists of the various ropes employed in

hoisting and lowering, and tricing up and trimming the yards and sails. Different kinds of ropes are employed in rigging. Ropes are a combination of several threads of hemp twisted together by means of a wheel. These threads are called rope-yarns, and the diameter of the rope will be according to the number of yarns contained in it. A certain number of yarns are first twisted together. This is called a STRAND. Three or more of these again twisted form a rope. According to the make of these strands in a rope, it is said to be cable-laid, shroud-laid, or hawser-laid.

A shroud-laid rope is formed of four strands, each of four yarns, and is laid right-handed,—that is; with the sun.

A hawser-laid rope consists of three single strands each, containing three yarns, and is also laid with the sun.

A cable-laid rope is formed of nine strands, each of nine yarns. These nine strands are first twisted three together, and then the three thus formed are laid left-handed, or against the sun. It is so laid to exclude the water.

The most useful knots are the reef knot, stopper knot, bowline knot, running bowline, bowline on a bight, sheet bend, Carrick bend, timber hitch, Blackwall hitch, rolling hitch, studdensail bend, clove hitch, marling hitch, throat seizing, shroud knot, single wall, wall and crown, Matthew

Walker's, Turk's head, cat's paw, sheep-shank, short splice, eye splice, cut splice.

Ropes are also wormed, parcelled, and served.

A rope is wormed to give it a round appearance. It is parcelled, or covered with tarred canvas, to preserve it from wet. Service is put on to protect it from chafing.

Ends of ropes are pointed to make them look neat, to pass through a sheave hole more easily, and to prevent them from untwisting. Whipping a rope prevents it from untwisting. All these knots and splices and bends and seizings are often done in a very rough way by old-fashioned seamen. I remember, when aboard one of the training ships of the navy, being shown a grummit turned in by a lad who had been only six weeks on board infinitely superior to one made by a man who had been sixteen years at sea. One was done on a systematic principle by the lad, who was properly taught; while the old seaman did his work in a rough way without any rule. Many of these knots and bends you will find very useful, and therefore I advise you to study them.

Certain implements are required. One known as a FID is made of hard wood, thick at one end and tapering to a point.

A MARLIN-SPIKE is an iron pin of a similar shape, with a knot at the end, or a hole through

which a piece of ropeyarn can be passed to secure it round the neck.

A wooden MALLET is also required for putting on service to a rope. It has a handle, and on the opposite side a groove into which the rope fits.

The best book on seamanship ever written, and most in vogue in my early days, was called "The Young Sea Officer's Sheet Anchor," by Darcy Lever, Esq., who was either a purser or an officer of marines. Little change in the art of knotting and splicing has taken place since his time; and I observe that most descriptions of knots and hitches have been copied from his well-illustrated book. As, however, great improvements in general seamanship have taken place, it has become obsolete, and it has been superseded by others at a much less price. To one of these works I refer the lad who either intends actually to go to sea, or wishes to become a thorough amateur sailor. If only the latter, let me assure him that he has plenty to learn, as the book itself will prove to him. I will, however, give a few of the splices and knots which may be found generally useful. To splice a rope is to unlay and open the strands, and then to unite the parts by interweaving them together in one of several ways.

A SHORT SPLICE.—Unlay the strands of the two ropes you have to join, and then, taking one in each hand, interweave them as you would your

fingers. Draw them close. Having opened the opposite strands with a marlin-spike, pass the loose strands through alternately; draw them tight. Again to strengthen them work open the strands, and alternately pass the strands in. Cut the ends off, or scrape them, and serve them over with spun yarn.

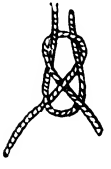
A LONG SPLICE.—Unlay the strands for a much longer distance than for the short splice. Unite them as before. Fill up the space left by one unlayed strand with the strand opposite and next to it. Having turned round the rope, take hold of the two next strands, which will appear opposite their respective lays. Unlay one, and, as before, fill up with the others opposite to it. Next split each of the strands in two, and knot the opposite half strands together. Fill up the vacant lay with them. Stick the ends of the six half strands under two strands. Stretch the splice thoroughly before cutting off the ends. The object of a long splice is to unite the ends of a rope which have to pass through a block so as not materially to increase its size.

AN EYE SPLICE.—This may be called a loop. It is formed by opening the end of a rope, bending it over according to the size of the eye you wish to form, and then opening the lay of the standing part and working in the strands. Separate the strands, and put one on the top and the other below the standing part; take the middle strand,

BOWLINE KNOT.

A TIMBER HITCH.

A BLACKWALL HITCH.



A SHEET BEND.

A CARRICK BEND.

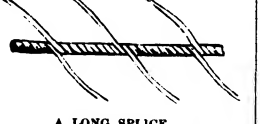
SINGLE WALL.

MATTHEW WALKER'S.

A GRUMMET.

A CAT'S PAW.

A SHEEP-SHANK.



A LONG SPLICE.

A SHORT SPLICE.

AN EYE SPLICE.

A CUT SPLICE.

and run it under its respective strand; take the next end over the first strand and under the second; take the third and last end through the third strand on the other side.

A CUT SPLICE.—Take two ropes; unlay the ends, and place them according to the length of the eye in opposite directions, the one overlapping the other. As has been done in the eye splice, splice in the strands of each end: serve them over.

A HORSE SHOE SPLICE is made on the principle of the former; the difference is in the shape. Unlay the two ends; make the bow with one rope and the cross bar with the other; splice them in when they meet.

### KNOTTING.

A REEF KNOT.—This is the most important of Knots. Landsmen often make what they fancy is a reef knot, but which proves to be a slip or Grannies' knot, proved by the contents of their parcels or boxes being scattered far and wide on the ground. Take the end of a rope round the standing part, under its own part, and through the bight; now bring the end next towards you over to the left, and the other to the right. Take the end on the right round that to the left, and draw them tight. The rule to go by is that the upper always keeps upper.

A BOWLINE KNOT.—Take the end of a rope in the right hand, and the standing part in the left.

Lay the end over the standing part; next turn a bight of the standing part with the left hand, and lead the end round the standing part once more through the bight.

A RUNNING BOWLINE KNOT.—This is a very useful knot. Pass the end of your rope round the standing part, and then through the bight; next make a single bowline knot upon the running part, and the knot is formed.

TWO HALF HITCHES.—Pass the end of the rope round the standing part, and then pass it up through the bight you have thus formed. Thus you will have made one half hitch; now make another above it, and the knot is complete.

A TIMBER HITCH.—Pass the end of a rope round a spar or timber-head; lead it under and over the standing part; next pass the end several times round its own part.

A COMMON MARLING HITCH.—This is very useful for lashing up hammocks or sails. Pass the end of the lashing round the hammock. With the end take a hitch round the longer part, and pass it three times round itself. Now haul taut with the longer part, and pass it again round the hammock, hitching it round itself, and continue passing the lashing round and hitching it, till the work is done.

WHIPPING A ROPE.—This is done to prevent the strands unlaying. Take the yarn or twine which

you are about to use, and place it in the lay of the rope pointing towards the end. Pass a few turns round the rope, thus securing the end of the whipping. Lay the other end on the turns already passed, pointing downward, passing the remainder on the bight, round the rope and the last end part. Haul through on the end part and cut off.

A SAIL-MAKER'S WHIPPING.—Small twine is put on with a needle. Reef-points have two such whippings at their ends. First draw the twine through the point of the rope, with the needle to its end. Pass several turns; stick through the point at each end of the whipping, and pass two crossing-turns. Secure with two half-hitches round the upper part of the crossing-turns, and haul the twine taut.

A GRUMMET is a circular band formed of the strand of a rope worked into itself. Unlay a rope and take one of the strands. It must be three times, with some to spare, the circumference of the grummet to be formed. Lay the right hand end over the left, and follow the lay round with each end until you have re-formed the rope. Secure the ends as in splicing, where they meet, and the grummet is formed.

I have mentioned but a few of the knots, splices, hitches, and bends, used by seamen. I will give a list of the names of others frequently employed; but I am certain that no description

would be of much use without practical experience in making them. I shall be doing much greater service to my young readers by advising them to get some old sailor to instruct them in the art of knotting and splicing. I must also advise them when they are bending on a rope to use their hands and arms freely, and to move as if they knew exactly what they were about to do. I can tell at a glance whether a man is likely or not to prove a good seaman by the way he handles a rope. Another thing—never be afraid of the tar-bucket. A first-rate officer I knew, who commanded a sloop-of-war in the Mediterranean some years ago, always had a number of midshipmen sent on board his ship to learn seamanship. He used to make them man the mizen-mast entirely, and even black down the rigging. They had, consequently, to dip their fists in the tar-bucket just as freely as the men had. They, in consequence of this training, nearly all turned out good seamen.

The following are the names of some of the knots, hitches, bends, &c. &c., including those I have described; but you may get any old seaman to show you how to make them. A shilling or two bestowed on him, which will enable him to buy himself some tobacco, or any other comfort, will probably make him very willing to instruct you. Learn especially how to make a reef-knot, two half-hitches, a fisherman's bend; how to belay

a rope, without knowing which no boy ought to be allowed to step into a sailing-boat. Not knowing how to do it, you fancy you have belayed a halliard, when down comes the sail, perhaps at a critical moment, and not being able to get out of the way, a big steamer runs you down: or you have an idea that you have made the painter of your boat fast, and you look round, and there she is floating a quarter of a mile astern, or nowhere to be seen: or you land on an island, and when you are under the impression that you have secured her to a tree, you perceive her floating calmly away, and you are left like Robinson Crusoe—Lord of all you survey, or All alone in your glory—but without the slightest prospect of obtaining anything for your dinner, till your prolonged absence induces your friends to send in search of you; and when at length, late in the evening, you, half-starved, are being pulled back, you hear one of the boatmen remark, "Ah, the young gentleman is something of a greenhorn, I suspect; he did not even know how to make his boat fast. He shouldn't be allowed to go out by himself, that's certain."

NAMES OF KNOTS, HITCHES, BENDS, ETC. ETC.

A Reef Knot.
Bowline Knot.
Running Bowline.
Bowline, or a Bight.
Stopper Knot.
An Overhand Knot.

TWO HALF-HITCHES.
A TIMBER HITCH.
A BLACKWALL HITCH.
ROLLING HITCH.
CLOVE HITCH.
A COMMON MARLING HITCH.
A MARLING HITCH.
A SHEET BEND.
A CARRICK BEND.
A STUDDING-SAIL BEND.
A ROUND SEIZING.
A THROAT SEIZING.
BACKING SEIZING.
A FLAT SEIZING.
A SHROUD KNOT.
SINGLE WALL.
WALL AND CROWN.
DOUBLE WALL AND CROWN.
FRENCH SHROUD KNOT.
MATTHEW WALKER'S.
TURK'S HEAD.
TURK'S HEAD WORKED INTO A ROPE.
A FOX.
A GRUMMET.
POINTING A ROPE.
GRAFTING A ROPE.
ROSE LASHINGS.
A NETTLE.
THUMB LINE.
WHIPPING A ROPE.
A WEST COUNTRY WHIPPING.
A SAIL-MAKER'S WHIPPING.
CROWNING THE END OF A ROPE.
A SELVAGEE STROPP.
A CAT'S PAW.
A SHEEP-SHANK.
HOW TO SLING A CASK.
HOW TO SLING A MAN.
HOW TO BEND TWO HAWSERS TOGETHER.
HOW TO WORK A CRINGLE IN A ROPE.
HOW TO BEND A HAWSER TO THE RING OF AN ANCHOR.
NET-MAKING.
BOAT'S FENDERS.
HAMMOCK CLEWS.
SPANISH CLEWS.
HOW TO DRAW AND KNOT YARNS.
A MARLINSPIKE HITCH.
COMMON SINNET.
ROUND SINNET.
SQUARE SINNET.
SWORD MAT.
A HORSESHOE SPLICE.
HOW TO WORM, PARCEL, AND SERVE.
A SHORT SPLICE.
A LONG SPLICE.
AN EYE SPLICE.
A CUT SPLICE.
A GRECIAN SPLICE.
TO SLING A CASK WITH THE HEAD KNOCKED IN.
TO SLING A CASK WITH A ROPE'S-END.
SINNET FOR MATS.

The above list will give you some little idea of what a seaman has to learn. It is literally only the

A B C of seamanship. I must particularly advise you to learn how to sling a man, how to sling a cask or bale, and how to sling a cask with the head knocked in, whether or not you are going to be a sailor, because in ordinary life you are likely to find such knowledge very useful, and possibly most important.

## BLOCKS.

We next come to blocks. They are of different shapes and sizes, according to their objects. A block consists of shell, sheave, and pin. If it has one sheave, it is called a single block; if two, a double; if three, a treble, and so on.

The shell is made of elm or ash, and of late years of iron. It has one or two scores, for the purpose of admitting a strap, which goes round the block. Treble blocks are used ordinarily as purchase blocks.

A SHOULDER-BLOCK is like an ordinary block, but it has a projection at the bottom to prevent the rope which is rove through it from jamming between the block and the yard.

A SISTER-BLOCK consists of two blocks made out of one piece of wood, one above another, strengthened by a band of iron.

A SHOE-BLOCK is something like the former, but

the lower is smaller, and lies in an opposite direction to that of the one above it.

A FIDDLE-BLOCK is in the shape somewhat of a fiddle. It also consists of two blocks one above the other, working the same way, but the lower is much smaller than the upper.

A DEAD-EYE is a block of wood with three holes in it, looking something like a death's-head. It has a groove cut round it for the shroud to lie in. It is employed for turning in the ends of shrouds and backstays. The three holes are for the laniards to reeve through.

A HEART, or COLLAR, is used for the same purpose as a dead-eye, but it has a hole in the centre, with scores at the lower part for the laniards to rest in.

A BULL'S-EYE is a wooden ring or thimble, with a groove round the outside for a rope to lay in.

A MONKEY-BLOCK is a common block, with a wooden collar made fast to the lower part.

A NINEPIN-BLOCK is a standing block fixed between two stanchions, with a sheave in the centre.

A BELAYING-PIN RACK is a ledge in the side of the bulwarks, with a number of holes in it, in which belaying-pins are placed.

*How to strap a Block.*—A strap is made by forming a ring by splicing the two ends of the rope together. Twist into the rope the length of once and a half round the block; worm, parcel, and

serve it, but leave room for splicing. Splice the ends with a short splice. Finish serving over the splice; secure it by a seizing round the end of the block.

A TAIL-BLOCK.—The strap is secured by an eye-splice, and then served over with spun yarn. Its appearance shows why the name was given.

A PURCHASE-BLOCK is a large block, with double straps.

A TOP-BLOCK is single, iron-bound, with a hook at the top.

A SNATCH-BLOCK is single, iron-bound, with a swivel-hook. In the shell of the upper part there is an opening. There is an iron clasp to go over the opening. It is useful for placing a rope in it without reeving it through.

A CAT-BLOCK is a large threefold block, iron-bound, with an iron hook attached to it for catting the anchor.

### WHIPS AND PURCHASES.

A SINGLE WHIP is the simplest purchase which can be used. It is a single rope passed through a block suspended above; it is employed generally for hoisting up light weights.

A WHIP AND RUNNER may be described as a large whip, with the end of the fall secured round the block of another whip; it thus consists of two whips.

A GUN-TACKLE PURCHASE.—This is made by reeving a rope through two single blocks, and making the end fast to the one through which it was first rove.

A LUFF-TACKLE PURCHASE.—This is composed of a double and single block, each with hooks. The rope is first rove through the double block, then the single, again through the double, and secured to the single.

A TOP BURTON-TACKLE is similar to a luff-tackle, but the upper is a fiddle-block, and that of the lower or luff is double.

A RUNNER AND TACKLE.—A runner is a thick rope, and has a hook fastened to one of its ends, while the other end goes round the upper tackle-block. The tackle has generally a small double block. The hook of the lower tackle hooks on to the object to be lifted, or to the side of the vessel. In the fore and aft of small vessels the backstays are always set up with a runner and tackle.

A LONG TACKLE.—This has two long tackle-blocks; these are sister-blocks, like two blocks joined at their ends.

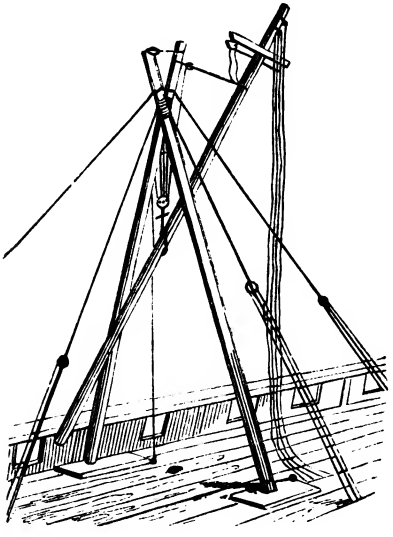
A TWOFOLD PURCHASE.—This consists of two double blocks. To make it, reeve the fall through one sheave of the upper block, then through one of the two lower blocks,—next pass it through the upper, then again the lower, and make the end fast to the upper.

A THREEFOLD PURCHASE.—This is similar to the above. Be careful to reeve the fall first through the middle sheave of the upper block, and then through one of the sides of the lower; and this, as you will see, will give an even strain on all the sheaves. It is very useful to know how to employ these various tackles. By a proper application of them the greatest weights can be lifted or removed.

Lower masts and bowsprit are got on board, and placed in their proper positions by means of sheers, which are large triangular erections of wood formed on board the ship, or sometimes on the wharf alongside which she is placed. The lower rigging has been meantime cut, fitted, served, and prepared by various operations for being placed over the mast-heads. The object of the standing rigging is to secure the masts in their places, and to support them when the force of the wind comes to act on them by means of the sails. The shrouds are fitted with what are called eyes, which are loops, which go over the mast-heads. The lower ends are secured to the sides of the ship by means of the dead-eyes and chain-plates. The bowsprit is also secured in its place by shrouds, and by what is called a gammoning. Gammoning is rope passed over the bowsprit, and through a hole cut in the knee of the head a considerable number of times. It is thus secured to the head, and counteracts the upward strain caused by the forestay sails.

The fore and aft-stays reach from the mast-heads to the lower part of the masts immediately before them or to the bowsprit. They serve the purpose of shrouds in supporting the masts.

RIGGING A SHIP.



STEPPING A MAST.

*Back Stays.*—These lead abaft the shrouds; they keep the mast from falling forewards, supporting them as do the shrouds.

*The Bob-stay.*—This stay leads from the end of

the bowsprit to the stern. Its purpose is to keep the bowsprit from rising up, which, with the pressure of the sails on it, it would otherwise do, and probably snap short off.

The lower rigging being set up, and the tops and caps got over the mast-heads, the topmasts have next to be got up. In the end, or heel, as it is called, of a topmast, there is a hole denominated a fid-hole. Through this a rope is passed, and the top-mast is got up and down the main-mast by means of the capstan.

Before the top-mast rigging can be set up, the FUTTOCK SHROUDS must be fitted. They reach from the outer edge of the top to the mast a few feet below it, where they are secured to an iron band round the masts. The upper ends of the futtock shrouds are hooked to the futtock plates, to which dead-eyes are fastened for setting up the top-mast shrouds. The top-mast cross-trees and cap have next to be got over. They serve the same purpose as the top and cap of the lower mast for setting up the top-gallant shrouds and securing the heel of the top-gallant mast. The top-mast is then hoisted up through the cap, the heel resting on the top with the fid passed through the fid-hole (fidded, it is called) to prevent it again coming down.

Backstays are then set up. Sometimes there are two on each side called breast backstays, and standing after backstays.

Top-gallant masts are got up much in the same way as the top-masts, but the operation is more easy.

Both the lower and topmast rigging have next to be rattled down; this is forming what would be called ladders with small rope, on the shrouds. The rigging is first sparred down; that is, any spare light spars are secured across the shrouds for the men to stand on. The end of a coil of rattlin stuff is then taken into the rigging, with an eye spliced in one end. It is seized to one shroud, and then secured by a clove hitch to the next, but at the end it is cut off and an eye is opened in it to secure it to the last shroud.

The jibboom has next to be rigged. It is what the top-mast is to the lower mast, and fits to the end of the bowsprit; it is fitted with foot-ropes for the men to stand on. It has a martingale stay which reaches from its end to the dolphin-striker. There are jibboom guys, which act the part of shrouds.

The dolphin-striker is a spar reaching perpendicularly from the end of the bowsprit towards the water; it assists in setting up the jibboom and flying jibboom rigging.

The flying jibboom fits on beyond the jibboom, just as a top-gallant mast does above a top-mast.

Spritsail yards are fitted to the bowsprit, and assist both in setting up the jibboom and flying

jibboom rigging; also for setting a sail, which is occasionally used, hanging from it towards the water.

I have now given a brief and rapid sketch of the various masts of a ship, and of the way they are got on board and rigged. The most important operation is that of getting the yards across—that is, hoisted into their respective places. When there, their proper blocks have to be secured to them, and then they have to be rigged. Foot-ropes and stirrups have to be fitted to them. Next bowlines, buntlines, clewlines, braces, lifts, halliards, throat-halliards to spanker, peak-halliards, spanker-boom sheets, and guys; spanker-boom topping-lifts, reef-tackles, leech-lines, slab-lines—the tacks and sheets have to be fitted; so have yard-tackle tricing-lines, staysail geer, storm staysail geer, studding-sail geer—indeed, it would be impossible to describe all the numerous ropes employed in working the sails of a ship unless in a regular treatise on seamanship; still I will describe the use of a few of them.

The halliards are ropes used to hoist up the yards; braces haul the ends of the yards about, either more or less, fore and aft, or across the deck, always horizontally.

Lifts, lift the ends up, and also tend to counteract the downward pressure of the sail, and to support the yard.

Bowlines stretch out the leech or outer edge of the sail, as the braces do the yard.

Buntlines assist in hoisting up the foot of the sail to its yard when reefing or furling sails.

Clewlines hoist up in the same way the clews or corners of the sails.

Reef-tackle pendents. These are ropes to hoist up so much of the sail as it is intended to reef.

The bridle is the part of the bowline next to the sail, and consists of three ropes, secured to different parts of the leech of the sail.

Tacks and sheets are fitted to the lower corners of the foresail and mainsail. The tack hauls the sail down to the fore part of the ship, or to leeward, while the sheet secures the opposite corner to the other, being the weather side.

Clew Garnets hoist up the clews of the foresail and mainsail.

Slab Lines hoist up the foot of the same sails when they are to be furled or clewed up.

The objects of all these ropes is to move about the yards with the greatest possible expedition and ease, to expand the sails, or to furl or reef them—indeed, to place the sails exactly in the position which may be required.

When it is remembered the immense number of these ropes, and the great force which it is necessary to apply to them, it may not appear surprising that the largest ships in the navy require upwards of

a thousand men to work them properly. This number, of course, embraces those who in action are employed in working the guns; still a large ship could not be handled sharply and well with fewer men.

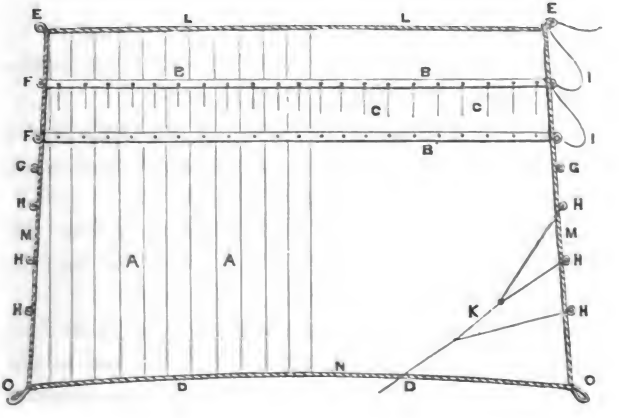
## CHAPTER IV.

### SAILS AND MASTS.

I HAVE now to describe a very important part of a ship, without which, unless provided with a steam-engine, she would be like a bird deprived of wings, or a carriage from which the wheels have come off—the Sails.

SAILS are made of canvas; it varies in strength and thickness. The thickest is marked No. 1, and it decreases in strength to No. 8. Sails are formed of pieces of this canvas; each piece is about two feet in breadth, and is called a cloth. Thus a seaman, when he speaks of having so many clóths in a sail, wishes to describe its width. Sails are strengthened by having a rope fastened all round them. This is called a bolt-rope. It has also particular names, according to the part of the sail to which it is secured. That at the top is called the head-rope; that at the side the leech-rope; and at the bottom the foot-rope. So these edges of the sail are called respectively the head, leech, and foot of the sail. The foot-rope is the stoutest, the leech-rope the next, and the head-rope the smallest.

SQUARE SAILS are the sails which hang from the yards, and are so called especially to distinguish them from the fore and aft sails, or stay sails, spanker, &c., which never can be set square or at right angles with the keel. Square sails have generally more cloths in them at the foot than at the head. The cloths are placed parallel to each other and perpendicular to the head. The breadth of a




A SQUARE SAIL.

**A** Cloths of the Sail.
**B** Reef Bands.
**C** Reef Points.
**D** Bolt Ropes.
**E** Earing Cringles.
**F** Reef Cringles.
**G** Earing for Reef Tackle Pendents.
**H** Bowline Cringles.
**I** Earings
**K** Bowline
**L** Head Rope.
**M** Leech Rope.
**N** Foot Rope.
**O** Lower Clews.

sail is diminished by being cut from the lower corners or clews diagonally towards the head. This is called goring a sail. Sails are also frequently gored more or less in the foot, some with an entire sweep or concave shape; others have only a certain number of cloths on each side of the clews gored, and the foot is then again parallel with the head.

A REEF BAND is a piece of canvas about a third of the width of the cloth, which is sewn across the sail with holes and gromets worked in it, for the reef-points to reeve through it. The band is to strengthen the sail, as there is a great stress on the canvas when it is being reefed.

At each end of the reef-band in the leech-rope a gromet is worked called a CRINGLE. It is a piece of rope spliced on to the leech-rope.

An EARING CRINGLE, which is made by the leech-rope being spliced into itself, is worked in the upper corner of a sail.

In the middle of the sail a cringle is worked called the LOWER BOWLINE CRINGLE; and at the foot, at equal distances, are two or more cringles called Buntline Cringles. All are worked round THIMBLES of copper.

THIMBLES are rings rounded in the inside, with a concavity or groove round the outside for the rope to fit in.

The CLEWS are similar to Cringles worked in the lower corner of the sail.

Sails are strengthened by additional cloths sewn on in places over the others. There are same above the buntline cringles called buntline cloths.

Sails have several REEF BANDS, according to the number of reefs it may be necessary to take up in them.

REEFING A SAIL is decreasing its size by rolling up a portion, and securing it by reef-points and earings to the yard. A square sail is reefed by the head or upper part; a fore and aft sail by the foot.

An EARING is spliced into the head cringle, or earing cringle and serves to secure the outer corner of the sail to the yard.

When a sail is to be FURLED, the men on the yard haul up so much of it as will cover the rest, which is called the SKIN. When all the rest is gathered up, this skin is thrown up over the yard, and the gaskets are then passed round it, and it is firmly secured.

Gaskets are made of soft plaited stuff, to secure the sails to the yards without chafing them.

Each of the reef-cringles have EARINGS, which are lines spliced on to them. The end of the first reef-earing is hitched to the head-cringle; the end of the second to the first reef-cringle; and the end of the third to the second. Thus, when reefing, the man at the outer end of the yard-arm gets hold of the end of the earing of the reef immediately below him, and, as it is expressed, hauls it

out, and hauls up so much of the sail to the yard-arm, when he secures it. If a second reef is to be taken in, he proceeds in the same way with the next. In a gale it is always the post of honour, difficulty, and danger. When a large sail has to be furled, it requires great strength and skill to do it expeditiously and well.

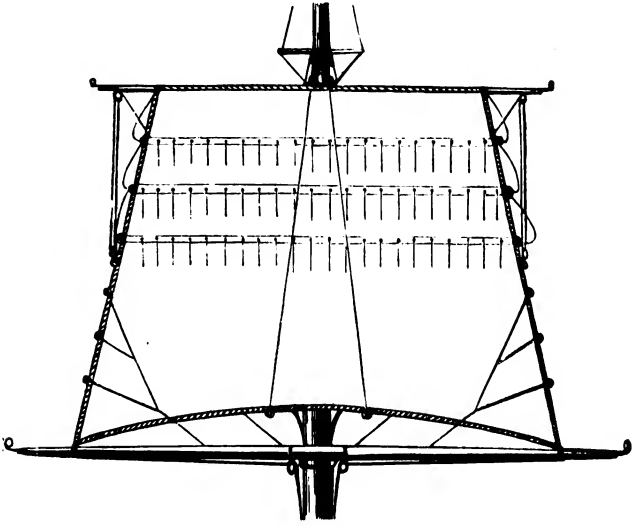
Sails are sometimes reefed with the assistance of what are called REEF TACKLE PENDENTS. These are lines rove through a sheave in the yard-arm, and coming down to the lowest reef-cringle, to which a block is secured. Sometimes there is another block at the yard-arm, through which the pendent returns. The head of the sail to be reefed is thus very easily hoisted up to the yard-arm.

BUNT LINES. The object is to lift up the foot of the sail. They are formed with a span, the two ends of which are secured to the buntline cringles. They lead up through a thimble to a block strapped to the mast-head. They lead in front of the sail while the slack lines lead abaft it.

The two following diagrams will explain more completely the descriptions I have been giving.

It must be understood that I am only giving a general description of sails and their different parts. Top-sails and top-gallant sails vary from the courses or lower sails; and sails in men-of-war are fitted in a different way to those in the merchant-service.

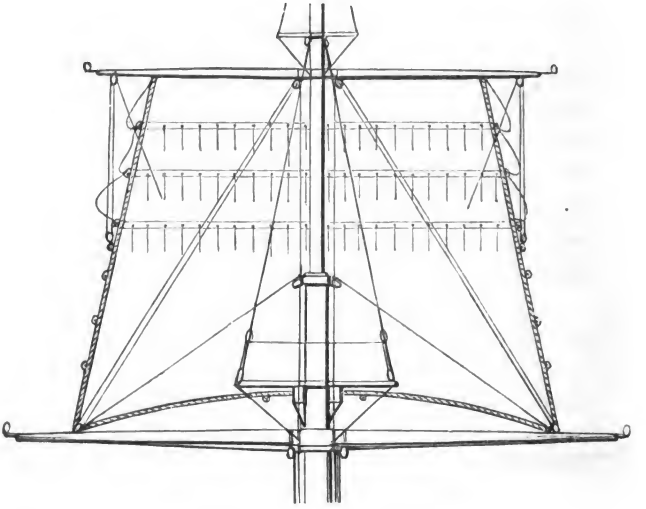
I have before described the use of BOWLINES, They extend the weatherleech of the square sails. The fore bowline leads to the fore-stay close down to the bowsprit. The fore-top bowline leads through a block on the bowsprit cap. The fore top-gallant



FORE-TOP-SAIL—FORE PART OF SAIL.

bowline leads through a thimble on the jib-boom end. The main bowline leads to a block lashed to the after-side of the fore-mast, the main-top bowline to a block in the after part of the fore-cap, and the main top-gallant bowline to one in the fore-top-mast cross-trees.

The FORE-TACK is secured to the boomkin end, then leads through a block in the clew of the fore-sail, and then through a block on the boomkin, and so in on deck.



FORE-TOP-SAIL—AFTER PART OF SAIL.

The fore-sheet is secured to a ring bolt in the ship's side, then rove through a block in the clew, and next led in board through a sheave-hole in the side.

The lighter sails of a ship are ROYALS, SPRIT-SAILS, and STUDDING-SAILS.

Royals are bent to yards, and often only sent up aloft when they are to be set. A boy is stationed aloft to cut the stops as they are hoisted up.

The SPRITSAIL is bent to the spritsail yard, and hangs down towards the water. They are, however, much gone out of use, but might still be found of importance to wear a ship should the foremast have been carried away.

STUDDING-SAILS are set on booms—light additional yards rigged out at the end of other yards.

The lower studding-boom has a neck at the inner end called a Goose-neck, by which it is hooked to the side. It has various stays to keep it in its place—a rope called a MARTINGALE, to keep it from flying up; an after guy, to keep it from flying forward; a fore guy, to keep it from flying aft; and a topping lift, to keep it up, and to top it, or to lift the outer end as may be required.

The top-mast studding-sail boom rests on what are called boom-irons, at the end of the top-sail yard. When not wanted it is lashed to the yard. When the studding-sail is to be set, it is got out by means of a boom-tackle in large ships.

The top-mast studding-sail is bent to a yard with knettles and earings. Studding-sails have sometimes a short, light spar along a part only of the head-rope. They are hoisted up from the deck, or from the tops, to a block secured at the end of the yard above them. The halliards then lead through

a block at their respective mast-heads, and so down on deck or into the tops.

They are only used in light winds when going free, that is, before the wind, or almost before it. At no time does a ship appear to greater advantage than with all her studding-sails and royals set, gliding majestically over the calm blue sea.

### FORE AND AFT SAILS.

We next come to the fore and aft sails. The chief of these in a ship is the spanker or driver. It is in shape like the mainsail of a cutter. It is, indeed, the chief sail set on the mizen mast. In a brig, which has no mizen mast, it is called the fore and aft mainsail. Formerly ships carried a sail answering its purpose on a long latine yard. It is bent to a yard or gaff, which has jaws resting against the mast; and the foot is stretched out by a boom called the spanker boom in a ship, or the main boom in a brig or schooner or cutter. The gaff is hoisted by throat and peak halliards. The throat halliards hoist up the inner end, or the jaws; the peak the outer end. The boom is worked by a sheet which passes several times through blocks. Its object is to press the after part of the ship away from the wind, so as to bring the head nearer up to it. The spanker is only set when the ship is on a

wind, as before the wind the mainsail holds the wind it would receive.

STAY-SAILS are generally triangular sails, and work up and down on the fore and aft stays, whence their name.

The UPPER outer CLEW is called the PEAK, and the inner the THROAT—the foremost lower clew the TACK, the after the SHEET. Patches of additional canvas are sewn on to strengthen the sails at those points. They are hoisted by HALLIARDS, and taken in by DOWN-HAULERS.

The fore staysail is set between the bowsprit and the foremast, and is the next sail to the fore-sail.

The JIB is in most respects like a staysail. It is set on the jib boom, to the end of which the foot is hauled out on a traveller, or hoop running on the jib boom. It is bent on the jib stay. It has the same powerful influence on the head of the ship which the spanker has on the after part, and is used to turn the head from the wind.

The FORE-TOPMAST STAYSAIL is a small sail hoisted to the fore-topmast between the fore-stay-sail and the jib. The tack comes down to the bowsprit end.

The FLYING JIB is set above the jib in light winds.

THE MAIN STAYSAIL.—This is a strong and triangular sail used formerly sometimes for laying-to.

It is found, however, that topsails, which are not so easily becalmed by the seas, are safer for this purpose. The sails above it are the MIDDLE STAYSAIL and the MAIN-TOPMAST STAYSAIL. These sails are four-sided; the fore part, however, being of much less height than the after, which is cut to suit the angle of the stay which they traverse.

The MIZEN STAYSAILS are much of the same shape as the last described. These sails are generally first brailed up before being taken in. Brails are ropes reaching from the outer tack of the sail, and leading up to a block near the throat.

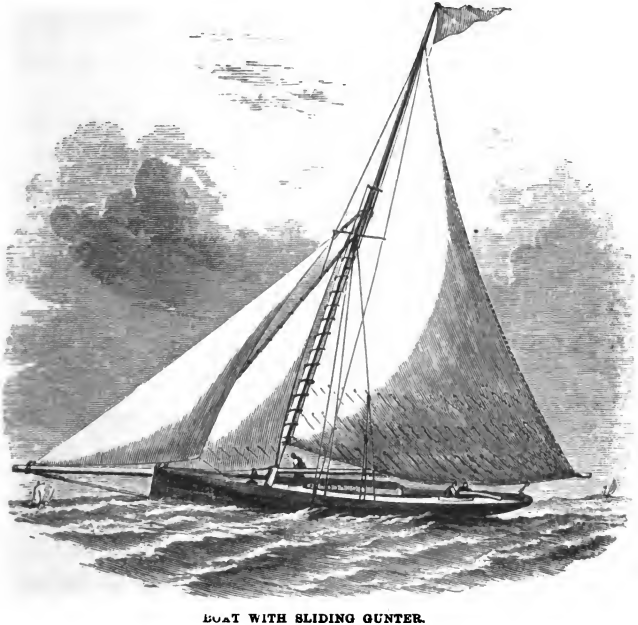
I have now given a tolerably full sketch of the various sails used in large ships. I may describe others when I come to mention the many various craft in use both by the English and in different parts of the world.

### SAILS CUT AND SET IN A VARIETY OF WAYS.

LUG-SAILS.—These are quadrangular, but not equilateral, the outer leech of the sail being longer than the inner. They are set on stout yards, which are hoisted across the mast fore and aft, the halliards being made fast at about a quarter or a sixth of the distance from the fore end. They have to be dipped each time the vessel or boat goes about. They are generally used on board gigs and other long boats, but they are also employed on

board vessels of a hundred tons and upwards; but they then require very powerful crews to work them.

LATEEN SAILS. — These are fore and aft sails. They are almost triangular. They are set on a



BOAT WITH SLIDING GUNTER.

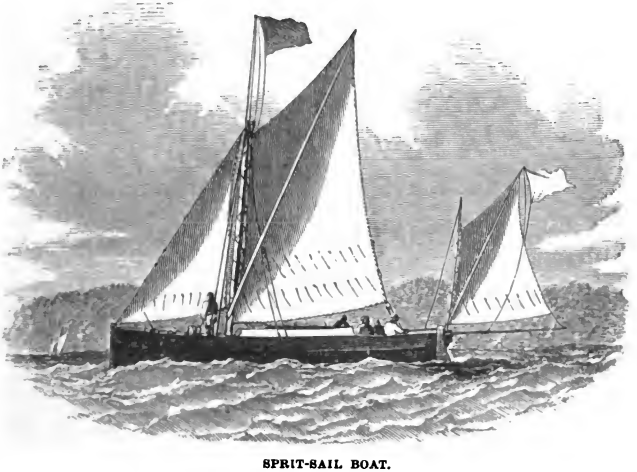
very long tapering yard, the masts of which are very short, and rake forward. The after-leech is thus by far the longest part of the sail. The head

is cut with a slight curve. Vessels with these sails are very common in the Mediterranean, as also along the west coast of Africa. They are, perhaps, the most graceful and picturesque of craft. The same rig is to be seen on the Thames and in many inland waters, but it is not suited for heavy seas, squalls, and rough weather. The illustration here given is of a beautiful lateen boat on the Thames.

SLIDING GUNTER.—Many men-of-war boats are rigged with this style of sail. It is triangular, and is bent up and down to a mast which has two parts, the upper part sliding down the lower. It has thus the advantage of being very quickly reefed and lowered. It is a graceful sail, and well suited for gigs and narrow boats which cannot carry much canvas; for, although considerable height can be obtained, the shape of the sail will not allow of a wide spread. For boat-sails I like it better than any other. Sometimes sliding-gunters are fitted with booms, and then they become dangerous unless a hand is stationed at the halliards to lower them in an instant. The boom spreads out the sail so much, that even though the sheet may be let go, the wind may not be shaken out of the sail.

SPRIT-SAILS.—These are fore and aft sails, with the outer or after leech much longer than the inner. The inner is laced on to the mast, and they are set up by a long spar called a sprit or spreet, the heel

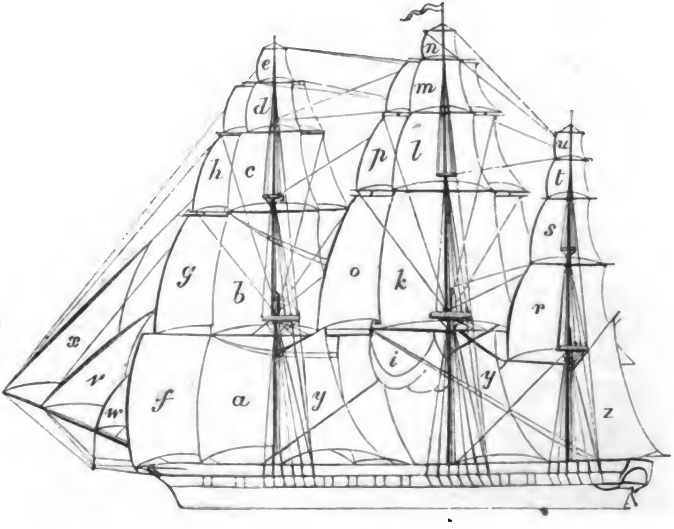
of which fixes into a grommet near the foot of the mast, and the upper end into the outer clew of the sail. They are used chiefly for small boats of fourteen or twenty feet in length. Ryde wherries and Thames barges carry them; but the spreet is hoisted up and lowered down by a tackle on board large craft. Spreet-sails are used by vessels, or



SPRIT-SAIL BOAT.

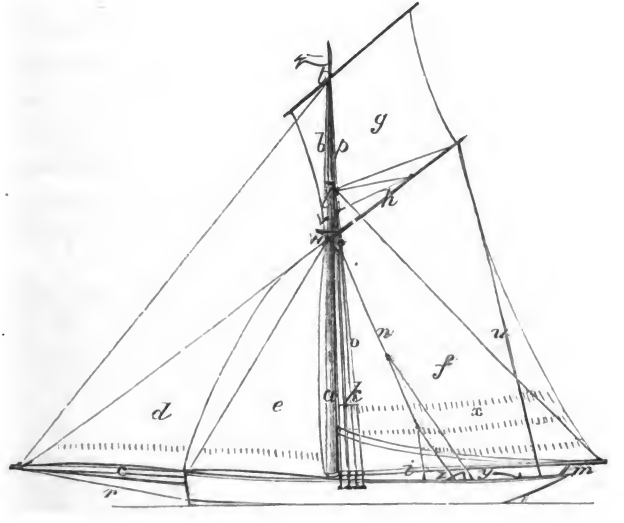
rather barges, which having to pass under bridges, have their masts fitted to lower down; thus sails and masts are lowered back together. The mast is stepped in a socket with a large hinge, and is lowered and hoisted by means of a tackle windlass.

SQUARE SAILS are sails which hang evenly from square yards, the cloths being perpendicular to the yards.




SAILS OF A SHIP.

*a* Foresail.
*b* Fore Topsail.
*c* Fore Topgallantsail.
*d* Fore Royal.
*e* Fore Skysail.
*f* Fore Studdensail.
*g* Fore Topmast Studdensail.
*h* Fore Topgallant Studdensail.
*i* Mainsail.
*k* Main Topsail.
*l* Main Topgallantsail.
*m* Main Royal.
*n* Main Skysail.
*o* Main Topmast Studdensail.
*p* Main Topgallant Studdensail.
*r* Mizen Topsail.
*s* Mizen Topgallantsail.
*t* Mizen Royal.
*u* Mizen Skysail.
*v* Jib.
*w* Fore Topmost Staysail.
*x* Flying Jib.
*y* Main and Mizen Staysails.
*z* Driver or Spanker.




SAILS OF A CUTTER.

*a* Mainmast.
*b* Topmast.
*c* Bowsprit.
*d* Jib.
*e* Foresail.
*f* Mainsail.
*g* Gaff Topsail.
*h* Main Gaff.
*i* Boom.
*k* Shrouds.
*l* Topmast Shrouds
*m* Main Sheet.
*n* Backstays.
*o* Topmast Backstays.
*p* Topmast Stays.
*r* Bobstay.
*s* Topping Lift.
*t* Ensign Halliards.
*u* Peak Halliards.
*v* Cross Trees.
*w* Jaws and Throat of Gaff.
*x* Reef Points and Earings.
*y* Tiller.
*z* Companion.

STAY SAILS are fore and aft sails, set on fore and aft stays, and are generally triangular, or, at all events, have the after leech much longer than the fore one.

TRY SAILS.—These are also called storm sails. They are fore and aft sails: some are set in the place of ordinary stay sails, and are of the same shape. In fore and aft vessels the main trysail has a short stout gaff, and is set in place of the mainsail but without the boom. On board a cutter it is a fine sail for laying-to under.

These are the various sorts and cuts of sails used on board English vessels.

## MASTS.

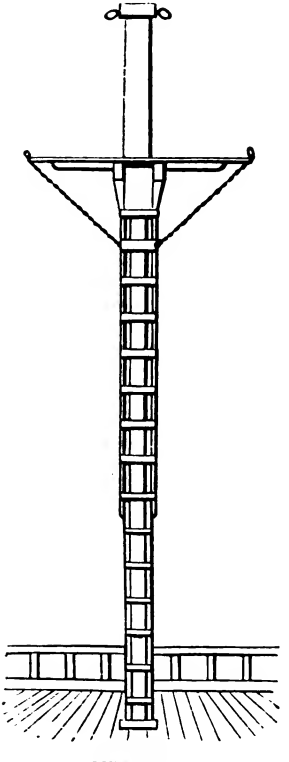
A very important branch of the trade of those engaged in preparing ships for sea is that of mast-making. Masts are of two kinds,—those cut out of a single stick or tree, and those composed of several pieces united, longways of course, which are called built masts. Masts require not only strength but flexibility; iron masts have, however, been introduced on board steamers. A built mast is composed generally of four pieces within its circumference. Thus a section will show like this:—

Formerly these pieces used to be united by iron hoops driven on while hot, which bound them all tightly together;

but of late years they have been united by MARINE GLUE. This composition is so powerful that no force will tear the wood joined by it asunder; and in all experiments which have been made the grain of the wood has given way, leaving the parts united by the gum still together. Neither heat nor cold nor wet has any effect on it. This is an immense advantage, as built masts can now be made much stronger than was formerly the case. Sometimes outer pieces or stout laths of wood are seized to the mast to strengthen it, called WOULDINGS.

The way in which the mast builder proceeds to make a single tree mast is as follows. He places the rough log or stick, after he has ascertained that it is sound, on a series of blocks or thwarts, pieces of timber piled one on another. Here it is trimmed, and the parts to be of the greatest thickness measured and marked out. The mast has the greatest diameter at the PARTNERS. The lowest part of a mast is called the HEEL or STEP, which part fixes into the kelson. Towards the upper end timbers are fixed on, called CHOCKS. Chocks support horizontal pieces of wood, called TRUSSEL-TREES. These trussel-trees again form the base or support for the TOP. The top is that platform built out near the summit of the lower mast, on which the seamen stand to assist in working the upper sails. In a large ship it is of considerable

size, so that a number of men can stand on it at a time. At the after part there is a rail called the top rail. The head of the mast is squared that the cap may fit on it. The CAP is a thick block of wood bound with iron. It has one square hole which fits on to the head of the mast, and a round hole in the fore part up which the topmast slips. Its object is to secure the topmast when it is fidded. An important object of the top is to stretch out the shrouds of the topmast, the topmast rigging, as it is called. The shrouds which lead from the outer edge of the top to the lower mast a few feet under it are called the FUTTOCK SHROUDS. There are traps or holes in the top immediately



LOWER MAST.

above where the lower rigging joins the mast. These are called lubbers' holes, because lubbers go through them instead of going up outside by the futtock shrouds, and so more quickly on to the topmast rigging. At the upper part of the lower mast there is a lighter mast, a sort of excrescence to it. This is the trysail mast, on which the jaws of the trysail gaff work, like the jaws of a cutter gaff. On the mizen there is a similar mast, on which the jaws of the spanker gaff work. The TOPMAST has a hole in its heel called the fid-hole, through which a fid is passed to prevent it when hoisted from slipping through the top on which it rests. Near the upper end are trussel-trees which support what are called CROSS-TREES. These serve the purpose of tops; they stretch out the top-gallant rigging, and the men can stand on them. They are, however, much lighter and narrower, and are formed of bars extending across the mast, the fore one being curved slightly. The top-gallant mast is much like the topmast, but of course, slighter, and has also cross-trees and a cap. The topmast shrouds have ratlines, but the top-gallant rigging has none, so that the seamen are obliged to shin up it. The lower yards of big ships are built like the masts. A visit to a naval dockyard would show their vast size, and you wonder how they can be got aloft into their places.

## CHAPTER V.

### SAILING.

We have now seen how a ship is built, how she is launched, how her masts and spars are made and placed, how the rigging is prepared and set up, and how the sails are cut, and how hoisted and set. The next thing to be done is to get the stores and provisions and water on board, and stowed away, and the guns mounted, and shot and powder in the magazine. The crew are shipped and appointed to their different stations, and all the men on board knowing exactly their respective duties, the ship is ready for sea.

You will next wish to know how she is sailed, how her course is directed over the ocean on the exact line on which those who navigate wish her to move, how she is made to avoid rocks and islands in her way, and to enter at last, through a narrow passage, the harbour for which she has been steered. Often too she may have the wind blowing exactly against her, or very nearly against her, for the whole of the distance, and yet by the skilful management of her officers she has been

able to make steady way, always advancing nearer and nearer the point at which she is aiming, To comprehend this you must first understand certain qualities possessed by wind and water. The water is elastic, and though it presses, it also gives way, and can be separated as by a knife. The sharper the instrument the more easily it can be separated. Thus you can pass the edge of a knife far more easily through it, than the flat of the blade, and in the same way the sharp stem of a vessel cuts through it far more easily than the side. The wind also presses. The purpose of sails is to receive this pressure. Unless in very strong winds and gales the object of the seamen is to obtain as much pressure on the sails as the wind can give, in order that the vessel may the more rapidly be forced along. If vessels only floated on the top of the water as a feather does, they would only sail in one direction like a feather that is directly before the wind. Therefore it is that the rounder and shallower a vessel is, the more readily she goes along before the wind, and the less able she is to sail on a wind, that is with the wind on her side. Although vessels have frequently to sail before the wind, that is with the wind coming from a point directly behind them, yet they have oftener to sail with it coming from some other point and striking on their quarter, on their side or beam as it is called, or even before the beam on the bows.

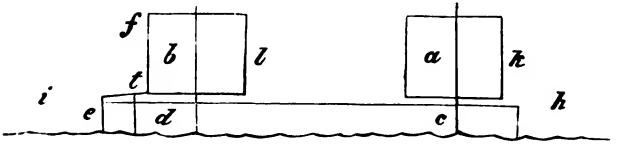
Now it is that the resistance or pressure of the water enables them to sail not only before the wind, but with the wind on their side or abeam. Even thus, however, they move a little sideways before the wind, because the water does not resist altogether; and this side movement, which is to be prevented as much as possible, is called making LEE WAY, or *going to leeward.*

It is necessary, therefore, that vessels should be sunk some way in the water, or have a hold of it; and it is on this account that they have keels and stems. The keel being placed below the body of the vessel, offers a resistance to the water; it also assists to keep her steady when she is inclined to roll, or to heel over by the force of the wind. It naturally, also, moves more readily with one end first, than sideways. This you will discover, if you attempt to tow a piece of timber sideways; you can scarcely move it, but if you tow it end first, you get it along with perfect ease. The stem acts much in the same way, by preventing the bow or head of the vessel from being so readily turned round by the wind, or away from it. The stem thus gives the bow what is called a hold or gripe of the water. Some round, flat-bottomed vessels, which have, like those of Holland, to sail up shallow channels, are furnished with what are called lee-boards. These are large oval-shaped boards, which are sunk down, when the vessel is on a

wind, below her bottom, and, by pressing against the water as would the palm of your hand, prevents her from going to leeward, or making lee-way.

I need scarcely again explain how a vessel sails directly before the wind. In days of yore, before the art of navigation was understood, we read of vessels remaining in port for weeks and weeks, and even for months, waiting for a fair wind. Those vessels had but shallow keels, while their sails could only be set directly across them, so that they could only sail just before the wind. I have now, however, to explain how a vessel sails with the wind on one side, or abeam. I shall afterwards have to explain about the balancing or trimming of the sails. I have said nothing yet about the rudder; because a vessel can be steered, especially a square-rigged ship, without a rudder, simply by properly balancing her sails. Now with regard to how a vessel sails with the wind on one side. The wind presses on one side, the water resists on the other. As she is built of a wedge shape, that is, sharper at one end than the other, she slips between the wind and the water, just as a little slippery fish would do which you might take up between your thumb and finger, and press them together. A vessel is, indeed, built like a fast swimming fish; the keel is like the snout, the bows like the head and thicker part of the body; and then a vessel, like a fish, tapers away towards the tail;

for it is found that after an entrance has been made in the water, that is, a way has been cut, the less she has to drag after her the faster she will sail. A vessel has, however, something else to do than merely to sail fast; she must have stability, and buoyancy, and capacity for carrying cargo, or guns, or passengers, and be of a shape to resist the force of the waves. Thus, formerly vessels were built nearly of the same width all along; now, under the water especially, after carrying their width a certain distance, they are narrowed away to the greatest fineness possible till the thickness of the hull merges in the dead wood and stern post. This is called the run, and a vessel which thus near the centre commences to decrease under water is said to have a fine run. Now we have to return to the log, or rather let us take a long plank weighted so that one edge may float upwards. Fasten two sticks one at each end upright on the board, and across each of the sticks fasten a small flat board so that it may turn easily as on a pivot.




I have marked the plank *d* and *c*. One flat board I have marked *a*, the other *b*. They will

answer the purposes of sails. I have shown that the plank will not move except with great force broadside away from you, but will easily move towards *h*. Suppose the wind to come from you, that is, from the eye of the reader. If the sails *b* and *a* were in the same line as *d* and *c*, they would certainly receive all the force of the wind they were capable of receiving, being at right angles to it, but they would tend rather to overturn the upper edge of the plank and to force it away from you than to send it towards *h*. Turn the sails, I mean the small square boards, diagonally across the plank so that the sides *l* and *k* are nearer to you than they were before—they, the sails, will not receive so much pressure from the wind as they did before, but what they do receive will have far greater effect in forcing the plank towards *h*. A sail always receives the wind as if it was blowing directly at it or at right angles to it, but the force is diminished in proportion to the smallness of the angle—that is, the more acute is the angle the less force does the wind exert on the sail; indeed, it stands to reason that a great deal of the wind slips off from the sail when the angle at which it strikes is very acute. The boards or sails *a* and *b* receive a pressure from the wind which, although not so powerful as if it came from *i* or aft, has still a tendency to drive the plank, sharp edge first, towards *h*. It cannot drive it directly away from you on

account of the resistance of the water; therefore, as long as the boards can be so placed as to receive the wind on their surfaces *a* and *b* with the edges *l* and *k* ever so little turned towards you, it will drive the board end first towards *h*.

We next come to the balancing of the sails. I have made *a* and *b* exactly of the same size, and one being placed at each end of the board *d* and *c*, they exactly balance it—that is to say, they exert an equal pressure on both ends. But suppose we double the size of *a*, and leave *b* as it was, what would be the consequence? why, the end of the plank at *a* would be forced round, or away from you, a greater weight of wind pressing on it, while the end at *b* would be brought nearer to you, and the plank, instead of moving with its end towards *h*, would move with its end away from you, or more or less before the wind. Take away *b*, the after sail, and place *a*, the head sail, directly across the plank, and it would sail away directly before the wind. Suppose, on the other hand, that we made *b* twice as large as *a*, or the head sail; the greater weight would now be pressing on *b*, and this would force *b*, or the after part of the vessel, away from you, and make *a* approach you, or move up nearer the wind. The plank would move on till the wind got on the opposite side of *a*, and also of *b*, when it would drive the plank also away from you; but this time *b* would go first. In other

words, the vessel would be brought head to wind, and would have stern way on her; that is, she would move stern first. It will be clearly understood, therefore, that in order to keep a vessel in a direct course, the sails at one end must be of such a size, and be so trimmed that they do not contain more wind than will balance the sails at the other end. For the same cause a vessel can be moved in one direction or in another by hoisting or lowering her sails at either end, or, which is equivalent to it, letting the sheets fly, so that the sails cannot hold the wind, or brailing them up. This is done in tacking, when it is necessary to bring the head of the vessel to the wind; if the wind is shaken out of the head sails, or, rather, the sheets are let fly, and all the pressure being then on the after part of the vessel, that part is forced away from the wind, and the head is brought up pointing so much at it—that is, so close to it—that the wind strikes the other side of the sails, and then, the head sails being once more rapidly set, the head is again pressed away from the wind. This movement continues till the after sails are trimmed —that is, till the head sails are balanced by the after sails—when the vessel again continues in a steady course. Another movement, called wearing, or keeping away, is performed by bringing the pressure of the wind on the head of the vessel. and taking it off the after part by loosing or

furling the after sails. In balancing the sails, however, it should be understood that it may not be necessary in practice to put the same amount of canvas exactly at one end as at the other, because the shape is so different. Vessels are deeper aft, and therefore have generally more sail aft than forward, because the deeper they are, the more hold of the water they have, or the more resistance it offers, and, therefore, the greater is the force required to overcome that resistance. Sometimes vessels have small stems, or only what is called a slight gripe of the water, and thus the head is more easily turned one way or the other. The great point to be aimed at, is to get a vessel into good trim, so that her proper sails may duly balance each other in all positions; when, being properly trimmed, the wind blows on them.

I have not hitherto described a very important part of the vessel, by which her course is more quickly altered than by the sails. I speak of the rudder. At the same time it must be understood that the rudder cannot entirely counteract the power of the sails, or the sails that of the rudder; when properly managed they mutually assist each other in steering the vessel. In our diagram *d c*, I have marked off a part of the plank *e*. Bend *e* towards you and suppose the plank to be moving on towards *h*. The water, you remember, *presses*. Now, if the plank moves towards *h*, it will be the

same as if the water came from *h* and pressed against *e*, turned, we will suppose, almost at right angles to *d* and *c*. Take a bit of card, mark it like the diagram, and bend *e* towards you. Now press your finger against *e* in the direction I tell you the water is pressing. The effect will be to drive the end *d* away from you, and to bring *c* nearer to you. Suppose *t* is a tiller placed on the top of *e*, with the end where *e* is on the same line as *d*, pointing towards *c*. When you bend *e* towards you the tiller will be pointing towards the opposite side to what you are on. You are on the starboard side; the tiller will therefore point to the port side. To make the head of the vessel turn to the starboard or right side, you move the rudder over to that side by making the tiller point to the opposite side. It will be at all times useful to consider the tiller as fixed on exactly above the rudder, and the rudder as a part of the vessel bent either on one side or the other. Now bend the end of the cardboard away from you, and press against it as if from *h* only on the opposite side, or port or left side. The effect will be to turn *c* away from you, and to bring *d* up towards you. The tiller will this time be pointing towards you, or to starboard. Vessels are, however, sometimes driven stern first by the wind getting ahead of them. Return to our plank, or rather to the piece of cardboard made like it; the wind is coming from *h*, and the plank is driving towards *i*.

Bend the end *e* towards you, or to the starboard side, and the tiller over to port. The water pressing against the rudder *e* will of course turn the head of the vessel away from you, or to port. Now bend the end *e* to the opposite side, and the tiller will be to starboard, or pointing towards you. Continue pressing back your cardboard against your finger, which acts the part of the water; you will find the head *c* turned towards you. It follows, therefore, that, when making a stern board, or having stern way on a vessel, you must put the tiller in the direction in which you wish the head to turn. Small vessels are steered with a tiller alone, which is guided by the helmsman's hands; but large vessels cannot be thus easily moved, and either a collection of blocks and ropes are employed, or a somewhat complicated piece of iron machinery, governed by a horizontal wheel, with spokes on the outer circle for the helmsman to turn it either to one side or the other. Generally speaking, the wheel turns in the opposite direction to the end of the tiller; therefore, if the order given is to put the helm a-port, the wheel is turned round towards the starboard side of the ship, or *vice versâ*.

I spoke of lee-way. When a strong gale is blowing on the side of the vessel, or from any point before the beam, and she can carry very little sail to send her ahead, she drives broadside

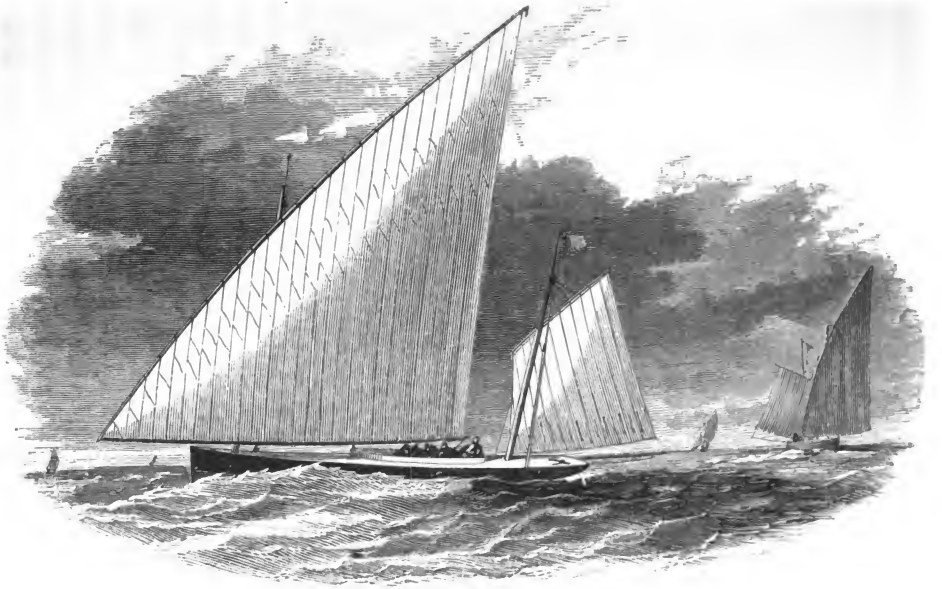
before the wind. When she is hove to also under a close reefed sail or sails, though she forges or moves ahead, she also moves broadside from the wind. It is this movement that is called lee-way, or going to leeward. The lighter a vessel is, or the less hold she has on the water, the more lee-way she makes. A deep, sharp and long vessel will make less than a shallow, short or round one. It is this tendency to move to leeward which makes it so dangerous for a vessel to be caught on a lee shore. She may be sailing with her head off the shore, and though she is actually going through the water in the direction of her head, she is making another movement broadside first towards the shore.

There are several qualities which vessels must have. These qualities are regulated in some degree by the way in which they are to be employed; but others are common to all.

A vessel must have stability and, to be able to carry her sails, she must have buoyancy, or be able to rise above the waves; she must have roominess to be able to carry her cargo, or guns, or passengers. It is, therefore, important to combine as much as possible all the necessary qualifications. She must have speed, and be a good sea-boat; she must therefore have sharp bows, but they must widen pretty rapidly, so as to give her good beam, and then she must have good wide floors and a

clean run, so as, once having made her way through the water, not to have too much bulk to drag after her. She requires depth both of hull and keel, to give her a good hold of the water, so that she may carry a sufficient press of canvas to drive her fast through the water.

If only one quality was sought for boats of speed, a vessel might be like a knife to cut through the water, and some steamers for smooth rivers are built almost like this; all the part under the water is in the shape of a Thames wherry, long and narrow in the extreme, but such a vessel has no buoyancy, or stability, or roominess below. They are often built with platforms and cabins high up above the water, but they are utterly unfit to go to sea. What we are speaking of are sailing, sea-going vessels. A very sharp vessel plunges into a sea instead of going over it. A long sharp bow, gradually widening to give her buoyancy and to lift her over a sea, is now considered the best shape. Beam or breadth is a very important quality. Some vessels have so much, that is, they are so wide, that they require very little ballast. Most vessels, however, require ballast. In men-of-war and yachts, and even in some merchantmen, pigs of iron are used—lead, even, sometimes, but I believe rarely. It is necessary to attend to the trim of a vessel, that her head is not too deep in the water, or her stern, or that she is altogether



LATINE-RIGGED BOAT.

not too deep, or too much out of it. The centre of gravity must also be ascertained, so that the heavier weights are in their proper position, for if not, the vessel will be apt to roll, and either roll her masts away or injure her hull.

What I have now told you will, I hope, enable you to understand clearly the principles on which vessels are sailed. All vessels, whether having one mast, or two, or three, are sailed on the same principles. The single mast of the cutter may be considered the point on which the sails turn. The mainmast of a ship is the point on which she works, and the foremast, of a brig or schooner. In reality, however, the exact pivot is not where the masts stand, but depends on the amount of the canvas spread on her. Boats are often fitted only with a single sail, a lug, or a latine sail, and they can be sailed as well as a ship with a dozen or more set on her. However, a mizen and jib are generally found convenient for working a boat. We have an example of this in the fine latine-rigged boat of which I give you a picture (*Plate A*). What a wide spread of canvas she has, and how beautifully her light yard tapers up towards the sky! The fore part of that latine-sail acts the part of a jib and foresail—the after-part of a mainsail, but in consequence of the mast being stepped so far foreward, it is necessary for her to have a mizen which is extended by an out-

rigger or bumkin. She is sailing close hauled on the starboard tack, that is, the tack of the sails is on the starboard side, while the sheets are over on the port side. A vessel of the same rig in the distance is sailing before the wind, with her mainsail over on her port side, and her mizen rigged out on her starboard side.

It would be almost impossible to teach you how to sail a vessel by merely verbal descriptions. I have given you the principle, and you must learn the rule by practice. However, you may find a few remarks useful and interesting.

You have understood from what I have told you, that a vessel is guided by her sails and rudder, but impelled only by her sails. Those sails, according as they are trimmed, may drive her in any direction away from the wind, head first, or sides first, or stern first, and even approaching the wind as near as four and a half or five points of the compass.

We will suppose ourselves going on board a cutter at her moorings. A cutter, as you know, is a vessel with a single mast, and has only fore and aft sails, a mainsail, jib, and foresail, and gaff topsail. Sometimes a flying jib is set, and she, when going before the wind, can rig out a square-sail, and even a square topsail. Our cutter is but a small one—fifteen tons or so. We can manage her. Ship the tiller. We will first set the main-

sail. Here are the throat halliards. Hoist away on them. That will do. Belay! Now for the peak halliards. Hoist away on them. The peak is half up. Belay them for the present. Now bend on the jib. Haul it out to the bowsprit end. Bowse taut the bobstay and bowsprit shrouds. Hoist the jib. Bowse it well up. Get the backstays and topmast stays well taut. Hoist the fore sail. Take a turn with the bowline round the foremast shroud on the starboard side. Now I'll take the helm. Lend a hand here, and overhaul the mainsheet. Settle the throat a little, and hoist the peak of the mainsail well up, that it may stand well. Hoist the gaff topsail. See that you keep the tack to windward of the peak halliards. Before you hoist the sail taut up, haul out the slack of the sheet. That will do. Now bowse down the tack. All right! Look out now for casting. Heave the buoy overboard; see that it is clear of everything. The wind has taken the foresail the right way to cast. Let go. Heave the end of the cable overboard. I'll keep the helm up till she has got way on her. We are close hauled on the starboard tack. We'll stand on for some distance on this tack, close hauled. Now we want to go about. What would you do? Keep her full; that is, that she may be moving rapidly through the water, and answer her helm at once. Slack a little of the jib-sheet; that is,

to take the pressure of the head of the vessel. Down with the helm. As we were on the starboard tack, the helm is put to port, to make her head turn towards the starboard side. Now let fly the jib sheet. This eases the pressure on her head still more. We haul in the mainsheet to get the mainsail over to starboard, to force the stern away from the wind, and to assist, consequently, in forcing the head up towards it. Now she comes round. The wind catches the other side of the foresail, and drives her rapidly round. Haul in the jib sheet before the wind fills the jib too much. Let the mainsail come over and right the helm. Let draw the foresail, and make fast the bowline. There we are now on the port tack. Next you want to keep away. Up with the helm; that is, put it to port. Ease off the mainsheet. Overhaul the lee runner, or the boom will chafe against it. Ease off the jib sheet. Away we fly, free, with the wind on our port quarter. We may soon put her before the wind, and set our square-sail. The main boom will then be right over on the starboard side. Steady with the helm. Take care you do not let it jibe over; that is, come suddenly over to port in consequence of the wind catching it on the other side, which it may very easily do. A lazy guy to the boom will be useful to prevent it doing that; but if the helmsman is wide awake, and not lazy himself, he will not

require it. Lower the foresail. Rig out the square sail boom. Now hoist the squaresail. Away we fly before the wind. Once more we have to haul up on a wind. Lower the squaresail. *Rig in* the boom. Hoist the foresail. Now lend a hand in flattening in the mainsheet. You need not touch the helm. You see she comes up to the wind without the aid of the rudder. Flatten in the jib sheet, or you will have her up in the wind. Bowse down the maintack. There we are on a wind again. We shall be able to fetch up to our moorings. Take in the gaff topsail. Trice up the tack of the mainsail. Haul down the foresail. I can shoot her up now. Lower the jib; be smart about it. Get your boat-hook ready. Hook on the buoy. Haul away. I'll come and help you. We have hold of the cable; slip it over the fore bit. That will do. Stow the jib and foresail. Now we'll furl the mainsail. Do it up in a neat skin. Do up the gaff topsail. That will do. Belay, and coil down the ropes. Now we've put the little craft to rights, we'll go on shore, and so ends our day's sail.

Before I conclude this branch of our subject, I must give you some important advice, to which I earnestly advise you to attend. The sort of boat in which you will probably commence your nautical career, will, I conclude, be from ten to fourteen feet long. Such was the one in which I first

began to gain my experience in seamanship. She was rigged with a spreet mainsail, a foresail, and a mizen—the mizen and foresail balancing each other. The spreet is a long spar, which reaches from the mast some way above the tack to the peak of the sail, thus stretching it out, and answering the purpose of a gaff, only thus no peak halliards are required. The butt, or lower end, fits into a grommet, which works up and down the mast, and by pressing it up, the spreet rises and stretches out the peak to the utmost. In taking in the spreet, be careful that the butt does not escape from your hand, and go through the bottom of the boat. If you understand the principles I have given you, after a little practice you will with these sails be able perfectly well to sail a boat of this description. A boat of this sort is, however, easily upset, either when on a wind by a sudden squall, before you can let fly the mainsheet, or by jibing over when running, or by being taken aback with the sheet over on what then becomes the weather side. Therefore, never belay the mainsheet. Hitch it so that you may slip it in a moment, or pass it under a cleat, and hold it in your hand.

Never skylark in a boat; either you may fall overboard, or upset the boat.

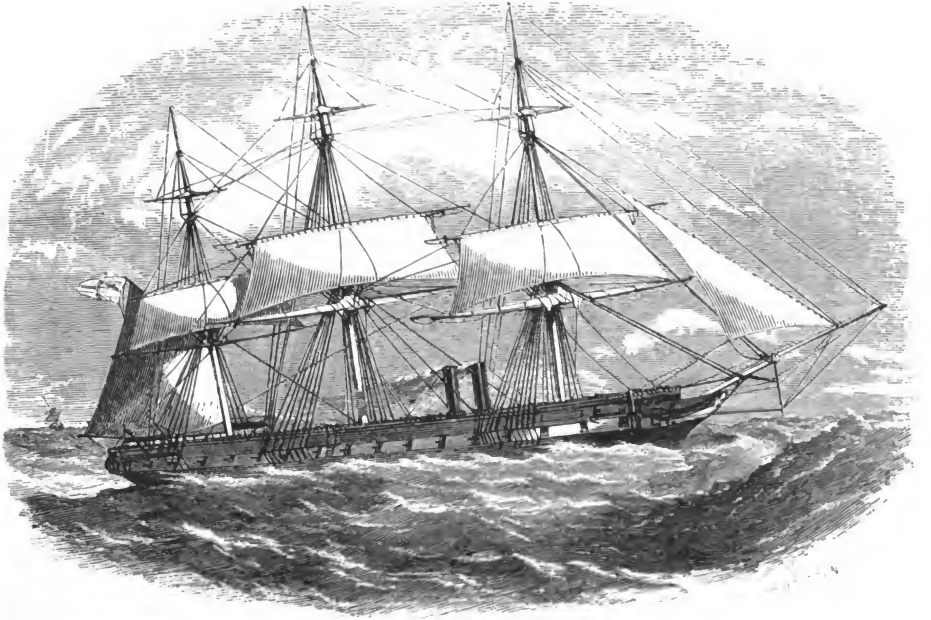
When steering, and the boat or vessel is on a wind, do not let her get into it; that is to say, do not let the wind get ahead. When you are steer-

ing with the wind directly aft, and the mainboom rigged out on one side, take care that you do not let it jibe over. You may chance, if in a boat, to upset her, or if in a vessel, to knock overboard some of the people on deck. Besides this, you may very likely spring the boom, and perhaps carry away the head of the mast, as I have more than once seen done. Indeed, by such carelessness, a vessel may in a moment be completely crippled.

When you go on board a vessel, ascertain where every rope leads, and where the halliards of each sail are belayed, so that, if required, you may let go the right ones. Never be ashamed of asking for information, and try and understand all that is offered. Learn at once how to make a rope fast, and to bend on one rope to another, as well as knotting and splicing in all their varieties. I have often seen a boat get adrift, or a sail come down by the run, or the mainsheet fly out, or the jib get away and begin flapping furiously, or the mainboom come swinging over, to the no small risk of all on board, and damage to the vessel, when some young gentleman in a yachting suit, who pretended to know a great deal about the matter, had undertaken to tend the sails. I have before said that if you wish to become anything of a practical sailor, you must learn to knot and splice, and more especially to hitch and bend on ropes. Should you fall overboard, do not struggle, but try and

float quietly on your back till the vessel can be put about, or a boat lowered to pick you up. Should anybody else tumble into the water, throw a grating, or an oar, or a life buoy to him; but take care, when throwing it, not to hit him, as it may injure him, and cause him altogether to sink. Be as calm as possible, and consider before acting what is the next best thing to be done—how you had best put the boat about to sail back to his rescue. As you approach him, get ready a rope to heave to him. If you have no boat to lower, stop the vessel's way as much as possible, and approach him as you would the buoy, if you were going to pick up your moorings. Take great care also not to run him down.

I believe now that I have honestly given you the result of my nautical experience in sufficient measure, that were you to take it all in you would in a very short time be able to become a very good boat or small craft sailor. But, I repeat, nothing but experience will enable you to become so altogether. Thus much, however, I can assure you, that if you have intelligence, with the aid of the admirable works now written on the subject, should you be able practically to study it, being constantly at sea, you may in a year become a better sailor than many men who have been all their lives afloat. Still there is a great deal to learn, and you must be very diligent to accomplish this.



"MERSEY" FRIGATE.

## CHAPTER VI.

### THE ROYAL NAVY.

In describing the very numerous English ships, vessels, and boats of all sizes, rigs, and for all purposes, under their respective heads, we will give the place of honour to the men-of-war, or Queen's ships, which constitute the ships of the Royal Navy. It must be understood, however, that the Navy of England, and indeed of the world in general, is in a transition state. Very rapid and great changes are taking place, and what is true with regard to the ships in use to-day may be very incorrect to-morrow.

The following account applied to ships of the Royal Navy till within a late period, and in some respects applies to them still. An entirely new class of vessels has, however, been introduced,—the iron-clad and turret ships, and I scarcely know how they will take rank, or rather to what rate they will belong. One thing is certain, that the smallest turret ship would sink the proudest three-decker afloat. They will be described in another chapter.

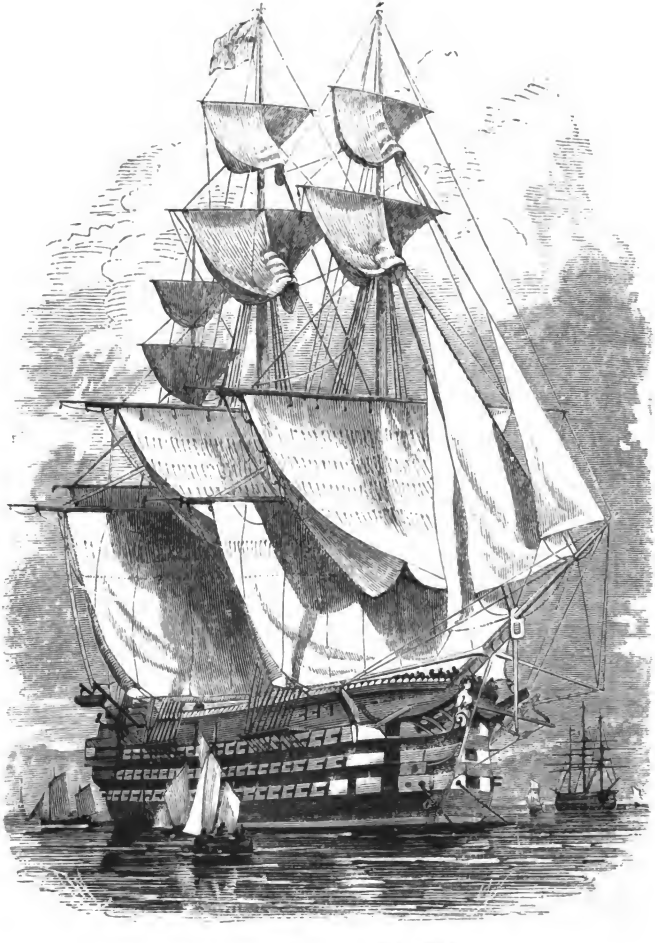
The ships of the navy are divided into different rates, called respectively first, second, third, fourth, fifth, and sixth rates. Now, the first three of these rates are called line-of-battle ships. The first rate includes all ships having three decks, carrying not less than 110 guns—some of them have now 130 guns—and whose complement of men amounts to not less than 950. In the second rate are included all ships which carry not less than 80 guns, and require a complement of not less than 750 men.

The third rate includes all ships of not less than 70, and under 80 guns, and are allowed a complement of from 620 to 750 men.

The fourth rate embraces all vessels carrying from 30 to 50 guns, with complements of from 300 to 450 men. In this class nearly all the frigates are rated, including the screw steam frigates, many as big as the two-deckers.

The fifth rate includes all those vessels with complements varying from 300 to 450 men.

The sixth rate should properly be divided into three classes. In the first class all ships commanded by a captain, that is, a post-captain; second class, all sloops of war and other vessels commissioned by commanders. Third class, all vessels commanded by lieutenants, and having crews of not less than sixty men. All other ships, of whatever description, when



THE "MARLBOROUGH" THREE-DECKER.

employed temporarily, are placed under one of these classes.

The magnificent three-decker, the *Marlborough*, of which a portrait is here introduced, will give an excellent idea of what a first-rate is like; yet even she, proud as she looks, is no longer of use as a fighting ship, and she and many like her will be used either as a training or receiving ship for seamen, or a coast-guard ship, or she will be cut down to her lower deck, will be deprived of her tall and symmetrical masts, and will be fitted with four or five huge cheese-like turrets, with a single gun in each. The ship thus fitted with five guns will have ten times more offensive power than the *Marlborough* with her one hundred and twenty guns.

A THREE-DECKER is so called because she has three decks, on the entire length of which she carries guns. She has, besides these, an upper-deck, on part of which she has also guns, and frequently there is a poop-deck and top-gallant forecastle besides above the after and forward end of this deck. The gun-decks are called main, middle, and lower. Below them, again, there is the orlop-deck and the hold.

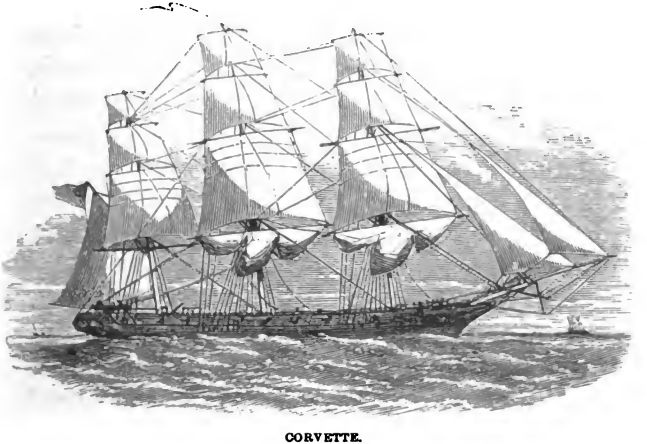
A TWO-DECKER has two gun-decks, and is mostly, in other respects, like a three-decker. Two-deckers vary in size, and especially in the weight of the guns they carry. According to

these circumstances they are classed as second or third rates. Various differences of necessity are made in their internal arrangements. When there is no poop the officers of different ranks each have to live on a deck lower. Thus the midshipmen are turned out of the gun-room—at least there is no gun-room—and they have to descend to a berth on the orlop-deck, where in a three-decker they sleep only.

A FRIGATE has only one deck—the main-deck under another, with guns ranged the whole length—but at the present day many frigates carry a battery along the entire length of their upper deck, of great weight of metal. These are usually called heavy frigates, not that they move slowly, but that the shot they send are heavy. Frigates have under the main or gun-deck what is called the lower deck, and is similar to the orlop-deck of a line-of-battle ship. Frigates are always commanded by post-captains; they carry from 28 to 50 guns. Formerly they seldom carried more than 48 guns, and those of light metal compared to the guns carried by frigates of the present day. The *Mersey*, of which a portrait is given at the head of the chapter, is one of the finest and most powerful frigates ever built; yet she, as a fighting ship, is of no use, and is reduced to do duty on the coast-guard.

A sloop of war may be rigged as a brig or a ship.

They are chiefly rigged as ships, and are then called corvettes. They carry from 16 to 24 guns, all on one gun-deck, above which there is no other deck except a poop and top-gallant forecastle. They are called flush-decked vessels, because the gun-deck runs evenly from one end of the ship to the other. The larger vessels are always ship-rigged, and those carrying from 20 to 24 guns are always commanded by post-captains. They are sometimes then called post-ships.



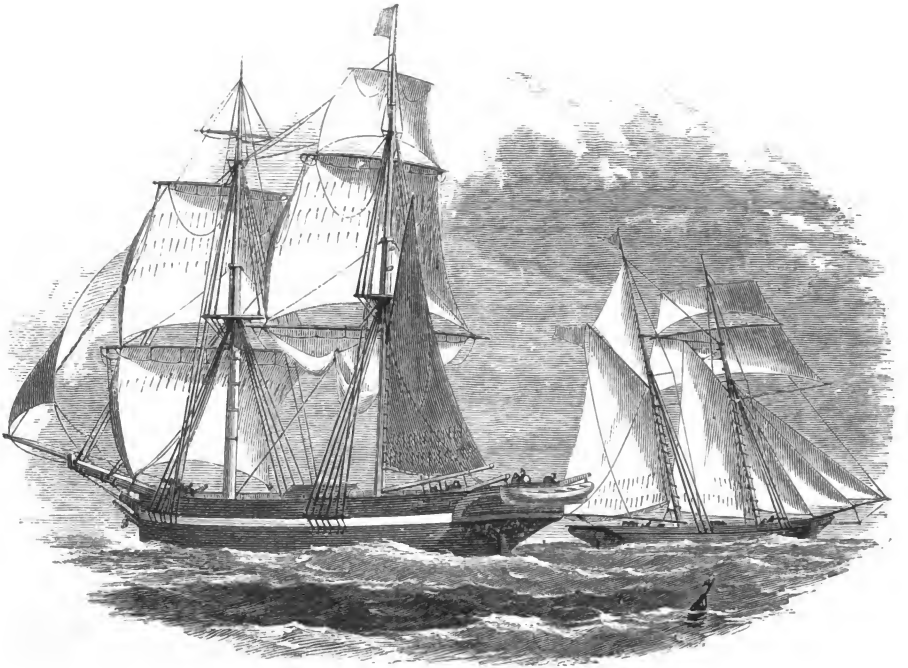
CORVETTE.

A SHIP.—The distinctive characteristic of a ship is that she has three masts—foremast, mainmast, and mizenmast; and that on each of these three

masts she carries square sails, which, as I have explained, are sails hanging to yards across the ship, placed at right angles to the masts; in other words, that all her masts carry square sails, in contradistinction to fore and aft sails. A ship has, however, also fore and aft sails, such as the spanker set on the mizenmast, the jib and stay sails. A corvette and a first-rate line-of-battle ship are equally ships, and rigged exactly in the same manner. All vessels larger than those carrying eighteen guns, and generally including those of eighteen guns, are rigged as ships.

BARQUES.—Some few men-of-war, chiefly those employed on special service, carrying few hands, although they have three masts, are not called ships. The foremast and mainmast are square-rigged, but the mizenmast has only a large fore and aft sail, called a mizen, and shaped like the mainsail of a cutter, with another sail set above it, called the gaff topsail. The mizen is generally narrower, and has more peak than that of a cutter. Vessels thus rigged can be more easily handled than ships and brigs, because the sails are smaller, and the mizen and gaff topsail take care of themselves. Exploring and surveying vessels are often rigged in this way, but no actual men-of-war.

BRIGS.—Only flush-decked vessels are rigged as brigs. A brig is a vessel with two masts, and on each of these masts square sails are spread; she



BRIG AND SCHOONER.

carries the same sails as a ship, with the exception of those on the ship's mizenmast. She has, however, two mainsails, the square mainsail and the fore and aft mainsail.

The vessel on the left in the drawing before us is a brig; she is going free on the starboard tack, that is, the wind is on the starboard quarter; she has her mainsail set, her square mainsail hanging in the brails, her main topsail and main top-gallant sail set, as also her foresail, fore topsail, and jib. Her fore top-gallant sail is aloft, but furled, and her fore staysail is hauled down. The vessel on her starboard quarter, or just to windward of her, is a schooner. Schooners have, like brigs, two masts, but they are rigged in a very different way. Brigs, as you will see in the plate, have tops, while schooners have only light cross-trees, sometimes little more than a cap, with two bars of iron across it. The chief sails of schooners are fore and aft: schooners are, however, of two descriptions; there are square topsail schooners, which carry square topsails on both their masts, and fore and aft schooners, which either carry no square sail, or, at all events, only on the fore topmast, like the one in the plate. Schooner's masts rake, that is, they incline towards the stern. The schooner before us I should call a fore and aft schooner, carrying a square fore topsail and top-gallant sail. In running, also, she would be able to set a large

square sail on her foremast; she is now standing close hauled on the starboard tack, under her mainsail and gaff topsail on her main mast, her foresail, fore topsail, and fore top-gallant sail, and also her fore staysail, fore topmast staysail, and jib. Her foresail is the sail cut very much like her mainsail. A regular fore and aft schooner would carry over that foresail a gaff topsail, like her main gaff topsail, and would have no square sails; such vessels frequently carry no topmasts, but send up light spars, called gaffs, with the gaff topsails bent to them, thus avoiding all unnecessary top hamper.

A BRIGANTINE.—While speaking of schooners, I must describe a brigantine, which is between a brig and a schooner, that is, the foremast is rigged like that of a brig, with a top, and on that mast she carries square sails and a square foresail, while her mainmast is like that of a schooner, with light cross-trees. It rakes also, and carries only a fore and aft mainsail and gaff topsail. These sails are, however, generally large in proportion to the size of the vessel, and altogether many brigantines are handsome and graceful craft. In the Royal Navy there were a few schooners and brigantines, but all such vessels are now superseded by steamers.

A KETCH.—A ketch-rigged vessel is to my eye the least graceful of all English craft; she has two masts; the foremast is low, and carries square

sails, with a steeving bowsprit—that is, the bowsprit rises up. The aftermast is stepped far aft with a short lower mast, on which a fore and after gaff sail is carried, and a gaff topsail.

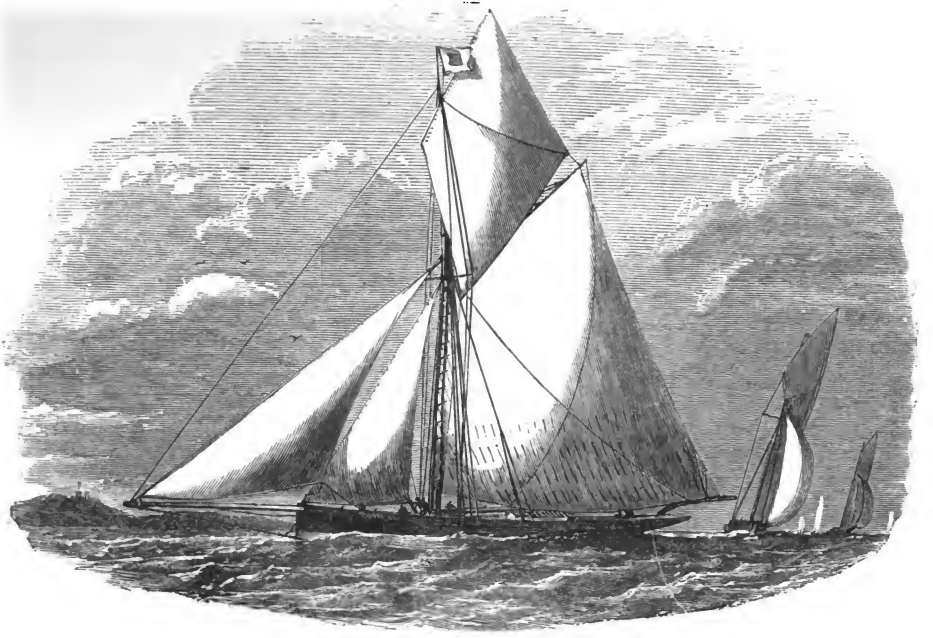
CUTTER.—The lightest and most elegant of all rigs is that of a cutter They are generally built with sharp bows, very clean runs, and overhanging counters. They are deep in the water, and their bulwarks rise very little above it. They are rigged with one lower mast, a topmast, and a bowsprit, without any steeve or rise to it. Their ordinary sails are mainsail, gaff topsail, foresail, and jib. They can carry a flying jib, or jib topsail, a square sail, and a square topsail when running before the wind. The mast has only light cross-trees, and the topmast can be lowered or raised with perfect ease at sea. This is generally done in heavy weather. A cutter carries a heavy main boom and gaff, and consequently requires a good many men to work her. There have generally been a few cutters in the navy, and it has been a favourite rig for yachts for the last half century. The cutter in the plate is standing close hauled on the starboard tack.

A YAWL.—A yawl differs from a cutter by having a small mizenmast right aft, on which a big sail is set. The mainmast, that is, the chief mast, is rigged like that of a cutter, only sometimes in small yawls the mainsail is set without a

boom, and even in larger vessels the boom must always be much shorter than that of a cutter, as the mizenmast would otherwise be in the way. The object of the rig is to avoid the long boom of the cutter, and thus to be able to work the sail with fewer hands.

STEAMERS.—Steam power has been introduced on board nearly all men-of-war. Nearly all the line-of-battle ships in the navy are now fitted with the auxiliary screw. At one time many men-of war were built with paddle-wheels, or were so altered that paddle-wheels were fitted to them, but it has been seen that the paddles would, in action, speedily be knocked to pieces by the shot of the enemy, and now all the men of war building are fitted with the screw.

Some are fitted with large screws and powerful engines, and those are classed as steamers. Others are fitted with small auxiliary screws, to be used in case of necessity, and they are classed, according to the guns they carry, as line-of-battle ships, or frigates. Some, again, are fully rigged and fully manned as frigates or corvettes, and yet have powerful engines; they are usually called steam-frigates or steam-corvettes; or screw-frigates or corvettes. The corvettes carry from twenty guns to twenty-two guns. Smaller vessels fitted with the screw, carrying seventeen guns and under, are classed as screw-sloops. There are also



CUTTERS.

still in the navy a large number of paddlewheel steamfrigates, corvettes, sloops, and other smaller craft, tugs, tenders, &c. &c.

During the war with Russia, a large number of screw gunboats were built, of about two hundred and forty tons; a very few were above that, and mostly under it. They carried from two to four large, heavy guns; and, when commissioned, were commanded by lieutenants. There was also a larger class of screw gun-vessels, from three hundred to eight hundred tons, carrying from three to six guns of the heaviest metal. There are also screw mortar ships, of twelve guns each, for throwing shells; and there are floating batteries, which measure from fifteen hundred to nearly two thousand tons, built for moving slowly about, and guarding the entrance to our harbours.

MEN AND OFFICERS OF THE ROYAL NAVY.—The ships and vessels I have been describing carry from fifty to one thousand men each, besides officers.

The men may be classed as able seamen,—called A B, or Able-Bodied, from the rating they receive being thus marked in the ships' books,—ordinary seamen, landsmen, and boys.

PETTY OFFICERS.—Some of the able seamen are rated by the commander as captains of the tops, forecastle, &c. &c. They are called petty officers; they are not classed among the officers, and may at once be disrated if they do not perform their duty properly.

WARRANT OFFICERS.—Some of the seamen who can pass certain examinations are selected, if they wish it, to become warrant officers. They receive a warrant from the Admiralty, and become either boatswain, gunner, or carpenter. They wear uniforms, and are treated as officers, have cabins of their own, but mess with each other. Many of them are very intelligent men, and frequently set to work to educate themselves.

MIDSHIPMEN.—The class of officers who enter the service, and are at once placed on the quarter-deck, with the prospect of rising to the top of the profession, are now called Naval Cadets. After a course of instruction, they, in two years, are ranked as midshipmen, and in four years, if they can pass an examination for seamanship and navigation, they become sub-lieutenants, and after that they receive a commission as lieutenants. After serving as lieutenants two years, they may become commanders, or master-commanders. From that rank, having served two or more years, they may be posted—that is, become post-captains. They must command a ship for a certain number of years to be eligible to become admirals, when a vacancy occurs; those who have not thus served are allowed to become retired admirals, and are not again employed. They are nicknamed yellow admirals, because no such flag exists.

The admirals are divided into three classes—

red, white, and blue; these are again divided into rear-admirals, vice-admirals, and full admirals, with the admiral of the fleet at the head of them.

Besides the class of officers I have mentioned, some enter as volunteers of the second class. They are placed on the quarter-deck, and associate on perfectly equal terms with the rest. They become masters' assistants, then second masters, and then full masters. Their duty is especially to attend to the navigation of the ship. Masters have, of late years, been promoted to the rank of commanders, and retired masters have received that rank, while several have been posted. There are several civilian officers who enter as clerks, and become paymasters, and pursers, and admirals' secretaries. Others, medical men, enter as assistant surgeons, and become surgeons. Large ships also have a chaplain and a schoolmaster.

I must not omit a very important class, the marines. They are generally sent on board a ship to remain all the time she is in commission. A large ship has one or more companies, commanded by captains. Smaller ships have only lieutenants, with half a company; while sloops of war carry only a sergeant or corporal, and the number they usually command.

Small vessels are commanded by lieutenants, or mates, or second masters; sloops and small corvettes by commanders; and all larger ships, fifth-

rates and upwards, by post-captains, according to their standing in the service. A line-of-battle ship, besides the captain, has a commander under him, who does the duty of a first-lieutenant. There are five or six lieutenants, a master, surgeon, pay-master, captain of marines and two or more lieutenants, and a chaplain. All these officers mess in the ward-room, and are therefore called the ward-room officers. In frigates and corvettes, where there is no ward-room, the lieutenants mess in what is called the gun-room, and they are therefore called the gun-room officers. In corvettes and other flush-decked vessels, the gun-room is just before the captain's cabin, while the midshipmen's berth is on the after-part of the lower deck, generally on the starboard side, just before the gun-room. The midshipmen sleep in hammocks in frigates and flush-decked vessels, just outside the berth, as the mess-cabin is called; in line-of-battle ships, on the orlop deck. The seamen also sleep in hammocks, slung fore and aft to the beams of the lower deck. A hammock is a long piece of stout canvas, which curls up at the sides, and narrows at each end like a canoe; it is secured at each end by a number of small lines, which are called clews: these are united at, and secured to, a ring, called a grummet, to which a lanyard is made fast. By the lanyards each end is secured to the beams, or rather to hooks fastened to the beams;

by this means the hammock swings from side to side as the ship rolls, and a very comfortable bed it makes. A common trick, when practical jokes were more common than at present, was for midshipmen to cut each other's hammocks down, when the poor sleeper was precipitated out, often head first. More than one poor fellow has got his skull thus fractured, or has been otherwise severely injured. In the daytime hammocks are lashed up to look like big sausages, and stowed in the nettings on deck. Each hammock is numbered, so every man knows his own, and can get it in a moment, either in the morning when the hammocks are piped up to be stowed in the nettings, or at night when they are piped below to be slung ready for use.

It stands to reason, that while the crew require rest, it is still necessary at sea, during the night, that a number of men should be on deck; the crew are therefore divided into two watches, called the starboard and larboard watches. The term larboard, which means left in steering and speaking of the respective sides of the ship, is now abolished, and the term port substituted, starboard and larboard sounding so much alike. Each general watch lasts four hours, except the watch from four to eight in the evening, which is divided into two, which are called the first and second dog-watches. This arrangement is made chiefly that those who have kept the middle watch,

we will say one night, may not have to keep the same the following night, and thus have to turn out in the middle of the night. We will say that the watches begin at eight o'clock in the morning: suppose the starboard watch is then called—that party of men continue on duty till noon, four hours; then from noon till four the port watch is called. From four to six the starboard is again on duty, being the first dog-watch. From six to eight, the second dog-watch, the port watch is on deck. From eight to midnight the starboard watch is on duty. At midnight the port watch is called, and they come on deck and remain till four A.M. At that hour the starboard once more comes on deck, and remains till eight A.M., at which time we supposed the watches to begin. Thus, you see, the next day, the port watch is on duty from eight to noon. You know the meaning of the letters A.M. They mean *ante meridiem*—before mid-day. P.M. stands for *post meridiem*—after mid-day. At the end of each half-hour during a watch a loud bell is struck, so that all on board may know the hour to attend to the duties of that time. For each half-hour which has elapsed a stroke is given. Say the watch begins at eight A.M.: at half-past eight one stroke is struck; at nine two strokes; at half-past nine three strokes; at ten four strokes; so that, at twelve o'clock, or noon, four hours having elapsed, eight strokes are struck. Each stroke is

commonly spoken of as a bell, so that it is usual to say, "It has *gone* four or five, or so many *bells*." When speaking of a certain time at sea, sailors say, "It *had gone* so many bells in such a watch;" or, "It was *near* four bells in the middle watch." On board merchantmen the bell is struck only at the end of every hour.

In speaking of the watches, I ought to have told you that the captain keeps no watch, nor does the master, who has charge of the navigation, and may have to be up at all hours to take observations. Each watch is commanded by a lieutenant, who has under him so many mates and midshipmen. The first lieutenant in many ships always takes the first watch from four to eight A.M. that he may see the decks well washed, the rigging set up, and any slight repairs carried out—indeed, the ship made trim for the day. The boatswain is also very active at this time, as the rigging is especially under his charge, and he wishes to see all his work attended to. The carpenter measures what water there is in the hold, and the gunner sees that his guns are all in order.

I must now describe the boats of a man-of-war. They are known under a variety of names. THE LAUNCH is the largest; some launches are thirty-eight feet long, and have ten feet or more beam. On foreign stations and on exploring expeditions they are sometimes temporarily decked over and

rigged as schooners; they have now generally steam-engines fitted to them. The others are the LONG BOAT, the BARGE, the YAWL, FIRST CUTTER, SECOND CUTTER, the GIGS, JOLLY BOAT, and DINGY. Smaller ships have only some of these boats. The captain has to carry him about his barge or his gig, the lieutenants one of the cutters or gigs, the midshipmen generally the jolly boat, while the dingy is used in smooth water, when only one or two people want to go on shore: the boatswain will perhaps take the last-named to go ahead of the ship to trim sails; she is perhaps only from ten to fourteen feet long, a mere punt indeed. The larger boats are always fitted with sails, and the officers often fit the smaller ones also with them; sometimes with latine sails, now and then as fore and aft schooners, but generally with lug sails.

The lighter of these boats are hoisted up out of the water by means of bars of iron bent over the sides towards the stern or quarters, and they are, therefore, called quarter-boats. These bent irons, which ship and unship, are called DAVITS. Davits were formerly made of wood, and I find that the Arabic word for a crooked piece of wood is *Davit*. Many of our sea-terms are derived from the maritime nations of old. The Phœnician fire-worshippers had on their decks a temple dedicated to the God of Fire. It was called a CABOOSE. We give the same name to the kitchens or cooks'

galleys on the decks of our merchantmen. But to return to the boats. To the end of the davits hang boat-tackles with hooks, or FALLS, as they are called. To lift the boat out of the water the tackles are lowered and the ends are hooked into rings in the head and stern of the boats which are hoisted up, and bands of rope are then passed under them to secure them to the side of the ship to prevent them from swinging. There is great difficulty often in lowering a boat in a heavy sea, and many officers have devoted their attention to the means of doing this; several ingenious contrivances have been invented for this object. The crew are generally lowered in the boat, and a sort of cradle has been invented in which she is let down on an even keel and in an instant freed from the falls, and able to shove off from the ship. Many lamentable accidents have occurred in consequence of the boats hanging to the falls. The large boats are hoisted in by tackles let down from the yard-arms so as to hang clear of the ship. The stay-tackles are employed for this purpose; their upper parts are drawn out—led out, it is called—to the yard-arms by guys. These boats come on deck, and are stowed on the booms in the waist of the ship,—that is, on the upper deck. The booms are a variety of spare spars kept ready for any purpose which may be required. The smaller boats are always clinker built, but the

larger ones are carvel built when more strength is required. The large boats are double-banked; that is, two men sit on each thwart. Some are pulled by twelve or many more men. The gigs have from six to eight men to pull. Each boat has her proper crew, generally with a midshipman belonging to her, and one seaman called the coxswain of the boat. The captain's barge or gig has always a picked man as coxswain; he is generally a favourite, and his captain carries him from ship to ship which he may command. The midshipman's duty is to see that his boat is kept in perfect order, all her gear in her, and ready to lower at a moment's notice. Paddlewheel steamers have large, flat-bottomed boats which are stowed on the top of the paddles, bottom up. They are very useful for landing troops. Some ships are also furnished with life-boats; all ought to have them. Life-boats are very strongly built with air compartments or masses of cork round their sides, so that they can float when full of water. They have beckets or loops round their sides by which people may hold on, or haul themselves in again if they are washed out. There are several inventions for lowering boats in a heavy sea so that the boat may be free of the ship the instant she touches the water, and the head and stern at the same time.

Ships of war have one or more life-buoys hanging over the stern. They are large floats with

bars across, over which a man can throw his arms. They are fitted also with port-fires, which, on being lighted, burn brightly even under water. There are two lanyards to them; one lets off the trigger to ignite the port-fire, the other lets the buoy fall into the water.

SIGNALS.—Ships are furnished with flags of different colours and designs by means of which they can communicate with each other at a distance apart. They are called signals; each flag represents a numeral, and thus any number can be made. All ships are numbered—then suppose a ship is numbered 365; three flags, three, six, and five, are hoisted. There are books to serve as keys. Long sentences are written, each with a particular number. Distinguishing pendants are hoisted to show what part of the book is referred to. Thus I find in Part V. of a code of signals invented by Captain Marryat, R.N., the well-known author, the number 2614, and the sentence against it, "Hostilities have commenced between." The rest of the sentence must be spelt by means of Part VI. in which all the letters are numbered. It would occupy too much space to explain the system fully; all I want you to understand is the principle by which signals are made. A code of night signals, with coloured lamps to be placed in different relative positions, has been lately invented by, I believe, one of the publishers of Marryat's

signals, and must be of great value. A midshipman is stationed on the poop with a telescope and the books and flags near him to attend especially to the signals when in company with other ships; he is called the signal midshipman. I should like to give you an account of all the duties of midshipmen; they are stationed in the tops where sails are reefed or the ship is put about, they are sent away in boats, they are sent aloft to look out, and they have many other duties in different parts of the ship. When speaking of the different officers, I mentioned the schoolmaster or naval instructor; the midshipmen have to attend his class in order to perfect themselves in navigation, and in other branches of scientific knowledge.

## GUNS.

Ships of war are armed with guns, called by landsmen cannon. The shot are always called round-shot. At the close of the last great war with France, the largest guns in ordinary use did not exceed in length 9 feet 6 inches, weighing 56 cwt. They carried shot 6⅛ inches in diameter, which weighed 32 lbs. These guns, being the largest, formed the lowest tier of a line-of-battle ship. One ship, the *Glatton*, a 50-gun ship, was armed with heavier guns. They were carronades —68 pounders on the lower, and 32 on the upper

deck. She beat off a French squadron of seven ships; allowing them to get near her, she opened on them with her terrific broadsides, and so pounded them, that some of them were almost in a sinking state when they got back into port.

At the present day, however, the ordinary guns with which our ships are armed weigh 100 cwt. and are 10 feet 6 inches long, while they carry a shot 10 inches in diameter, which weighs 84 lbs. Many guns now in use throw a 300 lb. shot, and some 600 lbs. Many shot in use are cone-shaped or conical, and can penetrate thick plates of iron. Guns throw solid shot and also hollow shot, or shells filled with combustibles, which burst on striking the object at which they are aimed.

The muzzle of guns, when about to be fired, are run through square holes in the ship's side, called ports. The lower part of a port is called the port cill. Strong eye-bolts are secured in the ship's side, to which tackles are hooked to work the guns—that is, that the crew may haul them about in the direction required. They also serve to secure the gun to the side when the gun is run in, and the ports are closed. A gun is mounted on a carriage of solid wood strengthened by iron. It runs on wooden wheels, called TRUCKS, and distinguished as the fore and hinder trucks. The axle of the gun, by which it works up and down on the carriage, is called the TRUNNION.

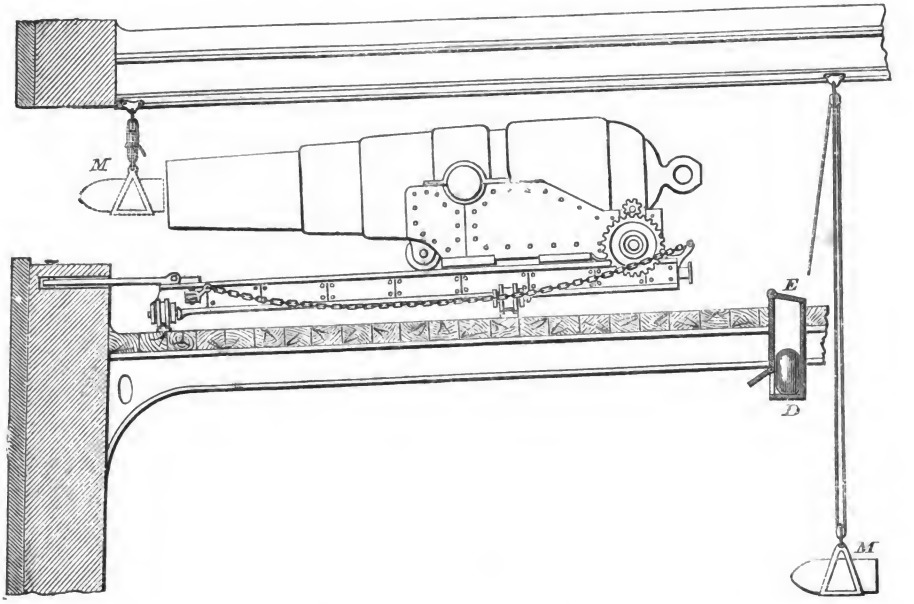
The mouth is called the MUZZLE, and the inner part into which the powder is rammed is called the CHAMBER.

The BREECH is the inner and thick end. The ropes which pass through a ring at the end of it, and secure it to the side by means of one of the eye-bolts I have described, is called the breeching. Its object is to restrain the recoil.

Guns have now percussion-locks fitted to them, similar to those of rifles, or other small arms.

Carronades are much shorter and thicker than long guns. They are elevated and depressed by means of a screw. They take their name from having been first cast at the iron foundry at Carron in Scotland. The men employed in working each gun are called the crew of the gun. One of the best men is appointed captain of the gun. They are taught a regular exercise, so that each man knows exactly what to do, and how best to exert his strength. Great improvements are taking place in guns in the present day. They are now being scored in the inside—a sort of fluting in the slightest possible corkscrew shape, as are the barrels of rifles; they are thus called rifled cannon. They can, by these means, send their shot to a distance of three or four miles.

I must now conclude this chapter. I hope that you may have gained from it some idea of what a man-of-war is like, as also of her internal economy.




CUNNINGHAM'S PLAN FOR WORKING THE HEAVIEST GUNS.

A very beautiful and simple plan for working the heaviest guns with great ease has been invented by Henry D. P. Cunningham, Esq., the inventor of the "patent self-reefing topsails," and the "patent brace machine and braces," by which one man can brace round the heaviest yards. The plan for working heavy guns has been adopted on board many ships of war, and will shortly be adopted on board all with heavy guns. It consists of a system of nippers and chains, and cog-wheels. It is so simple that it can instantly be screwed to the carriage of a gun, and, if shot away, replaced. The gun is trained forward or aft by a chain sunk in a groove in the deck of an arc shape, which the nippers take up as it passes over the machine turned by a winch. It is run in and out by a similar contrivance. Another ingenious device is also employed for loading the large guns. The heavy shot are lifted from the rack by a tackle, to a little overhead railway, which carries them to the muzzle of the gun, when the tackle is lowered, and one man slips the shot in, as shown in the illustration. *M* shows the conical shot as it is raised to the deck overhead and carried to the muzzle of the gun. *E D* shows how the winch is screwed to the gun-carriage.

## CHAPTER VII.

### MARINE MONSTERS.

WHAT schoolboy would fail to translate the line in the old Eton Latin Grammar, "Monstrum horrendum, informe, ingens," a monster with a steam-engine in its inside, or to assert confidently that it must refer without doubt to the iron-clads and steam-rams, and other similar marine monsters of the present day? Middle-aged gentlemen, and even those who have scarcely reached middle age, recollect the time when a few high-box paddle-wheel steamers constituted the entire steam fleet of the British navy.

Naval men regarded them, if not with contempt, with no friendly eye: they might be useful for despatch-boats, but for all purposes of warfare they must be ever utterly useless. That was the general opinion. No officer of spirit would, if he could help it, take command of a thing little better than a coal barge; and as to attempting to comprehend anything about the complicated collection of piston-rods and cylinders, and boilers and wheels, that was not to be thought of. When

the engineer reported that "She had blown off so much steam," the dignified reply was, "Make it so;" but as to what information the engineer intended to convey, the officer possessed a blissful ignorance. In process of time, as more steam-vessels were added to the service, it struck one or two aspiring young officers that it might be as well to learn something about the iron machinery which acted so important a part in the propulsion of their ships, and they obtained an entrance into private marine steam-engine manufactories, where, by working in fustian jackets with the men, they picked up some crumbs of practical information, and reaped their due reward, in most instances, by being appointed to the command of the improved style of steamers then building. At length, too, it dawned on naval men, that though steamers might not be able to fight, they would, at all events, be useful in towing ships of war into action, and as quickly as possible to take themselves out of harm's way again. It is, however, not the nature of British naval officers to be fond of such an employment, and before long, first one, and then another, stopped to see what effect the shot of the enemy would have on their hulls. They then discovered that from ordinary old-fashioned guns a steamer was not much more liable to injury than an ordinary sailing ship; a few blades of her paddles might be knocked away, or one whole

paddle, and still she might be able to work with the other, with the aid of her sails; and, indeed, should the boiler or machinery be damaged, she still could move with her sails. This discovery considerably raised steamers in the estimation of naval officers. Still, no one regarded them in the light of true men-of-war, or believed that they could ever be serviceable as line-of-battle ships, or even as frigates, except to do the work of scouts. The screws were not yet known. It was shut up in the mind of Mr. F. P. Smith, or brought into active existence only on his father's horse-pond at Hendon, in Middlesex. This was in 1834. In 1835, he constructed a model on a superior plan, with which numerous successful experiments were performed; and in 1836 he took out his patent for propelling vessels by means of a screw revolving beneath the water at the stern. Still, neither the Admiralty, nor engineers, nor the mass of naval men would believe in Mr. Francis Pettit Smith's screw. In the first place, he was a farmer, and what could a farmer know about driving a vessel, much less a ship of war, through the water, head to wind? Then, he was not a scientific man; he had not studied naval engineering. In fact, the thing could never be. It was an absurdity.

Two gentlemen, however, Mr. Wright and Mr. Caldwell, thought differently; and in 1836, with

their assistance, Mr. Smith, aided by Mr. Thomas Pilgrim, a practical engineer, built a vessel of ten tons, with an engine of 6 horse-power, which was tried with success on the Paddington canal, and then on the Thames. This was truly the germ of the steam navy of England. The tiny craft then put to sea, and encountered some severe weather on her passage to Dover, Folkestone, and other places, proving that the screw would answer as well in rough as in smooth water.

In 1838, the Lords of the Admiralty—the fame of the small craft which had done what so many scientific men had boldly asserted could not be done, having reached their ears—actually visited the creature, to satisfy themselves by ocular demonstration of the truth of the reports they had heard of her wonderful proceedings. So satisfied were they with what they saw, that they encouraged Mr. Smith and his friends to construct a regular sea-going craft, and the now far-famed *Archimedes*, of 237 tons burthen and 80 horse-power, was the result. She made a voyage round England, visiting all the principal ports, and also crossed the Bay of Biscay to Oporto. She answered in all respects the expectations of her constructors, going in smooth water at the rate of ten knots an hour. Still the engineers were not convinced that the suspicious-looking screw would answer under general circumstances, and several years passed by

before any merchant or passenger vessels were fitted with it. At length the Admiralty built a small craft, the *Bee*, fitted with paddles and a screw; a busy time she had of it, trying which afforded the best means of locomotion. The screw beating two paddles, the Admiralty, in 1843, ordered a vessel of 800 tons and 200 horse-power, the *Rattler*, to be built, and also the *Alecto*, of exactly the same size and power,—the first to be fitted with a screw, the latter with paddles. Again the screw principle triumphed over the old-fashioned paddles, and her Majesty's yacht *Fairy*, and twenty other vessels, were at once ordered to be built for screw-propellers; and by 1850, under Mr. Smith's superintendence, one hundred men-of-war had been built, or ordered to be built, on the screw principle. The screw works right aft, just above the keel. It at first appeared like a long blade going spirally round and round on an iron rod. This was called a one-threaded screw. It was, however, suspected that the entire turns would not be necessary, and it was accordingly formed with four separate fans.

During an experiment in Stoke's Bay, either the *Rattler* or some other vessel took the ground for a short time. When she got off, to the surprise of those on board, she went much faster than before, and it was afterwards discovered that one of the four fans of the screw had been broken off. Before

it was repaired a similar accident happened. It thus became evident that a screw with two fans was superior to all other forms, and is that universally adopted. It is obvious that a screw would, when not working, greatly impede the progress of a vessel under sail. From the first they were so constructed that they could be lifted up through wells, from the upper part of the vessel, out of the way, when it became necessary to let off the steam and use the sails alone. The funnels also were made on the telescope principle, so that they could be shut up and scarcely seen. A screw steamer could be thus converted in a few minutes into a sailing ship. The ordinary mode of placing the screw serves well enough for merchant vessels, but for men-of-war it is absolutely necessary to protect it from the shot of the enemy, and with that object other plans have been adopted which will be by and by described, when we come to speak of the twin screws and other adaptations of the same instruments. The screw, having won the day, was shortly introduced on board the old line-of-battle ships as an auxiliary power, as it was clear that without some such means of locomotion a small gunboat would, in a calm, have the advantage of the most powerful sailing ship in the British Navy. Several magnificent new line-of-battle ships, of a size far greater than any former men-of-war, were constructed, to be moved on the

same principle; and the nation was now satisfied that, what with screw frigates, with immense guns, corvettes, and gunboats, and these auxiliary screw ships of the line, old England would be well able, as of yore, to contend with all the world combined. So she would if it had not been for the inventive genius of certain gun-makers and artillery officers, who have produced engines of destruction, in the form of vast guns, which showed themselves capable of quickly blowing to pieces the sides of these grand-looking craft. Not only were fine old ships—such as Duncan, Howe, and Nelson led to victory—to be more than doubled as to size, and transmogrified in all sorts of ways, but the honest-looking round-shot was to give place to conical and other shaped missiles which would come crashing through the wooden walls of old England with as little difficulty as this steel pen can be run through a sheet of paper. The penetrating powers of these new conical-shaped shots induced people to devise plans for keeping them out of the inside of their fighting ships. Not only, however, had shot which come direct to be guarded against, but shells, which are much more inconvenient visitors, inasmuch as they come in overhead and burst, sending their fragments in every direction. For a short time the nation seemed to be in a state of despair of ever providing against these disagreeable contingencies, or rather certainties. They began to

believe that the day of England's supremacy on the ocean was over, she could no longer boast of ruling the waves, and that the utmost she could do would be to defend her harbours and her coasts from attack. It was asserted that the best mode of proceeding would be to build, in the first place, huge floating batteries with some steam locomotive power, to enable them to creep about a harbour from spot to spot, like gigantic crabs, as necessity might require ; and, in the second place, to build large iron-plated line-of-battle ships, and to alter the wooden ships in existence, and to make them sufficiently seaworthy to run along the coast to gain the shelter of some friendly harbour on the threatening of bad weather. A few fast steaming and sailing frigates and corvettes were to be kept for foreign service, to visit our colonies and settlements, to keep petty states and savages in order; but anything like an effective sea-going navy for England was to be abandoned.

Such was the idea of a considerable number of people who forgot the old saying, "that two can play at most games, and that, if an enemy could provide himself with a fleet to attack our harbours, we could equally construct one to attack his ; and that if our armour-plated heavily-armed monsters could not cross the ocean neither could those of our foes, and altogether there was something inconsistent in the reasoning of those who believed

that England's Navy had come to an end. What, however, was fatal to the scheme, was the discovery that these floating harbour batteries were likely, in most instances, to prove utterly unserviceable. If brought out to any place where they could be of use, the sea would wash over them; they would be tumbled about, so as to render the management of their huge guns very difficult; they would very likely drive from their anchors, and were not altogether invulnerable to shot or to the points of steam-rams; in fact, they might be more easily run down than any ordinary iron-clad.

Among the early inventions which the new order of things brought about was the steam-ram. She was to perform the part of the beaked galley of ancient days. The first unmixed ram floated almost under the water. She was armour-clad, with a powerful engine and screw, and a formidable iron beak which she was to stick into the side of the vessel it was desirable she should destroy, and then to back out again if she could.

It is a very sweet decorous thing to die for one's country, but naval officers prefer doing so on the quarter-deck of their ships, and not shut up in a dark hole, doing, to say the best of it, a somewhat sneaking, dirty job. It might have been rather difficult, therefore, to find officers ready to take charge of these submarine monsters. In the first

place, they could not carry coal enough to perform an ordinary voyage; those living on board would have been in a state of purgatory; and lastly, the ram, having run into a ship, would be very likely to destroy herself or to go down with her foe, while a well-directed conical shot from a powerful gun would probably quickly settle her fate. She might as a sea-monster, from a hole in a rock, dart on her prey, dash out of harbour against an advancing foe, and commit some damage; and if an enemy would come to assail us with such a fleet as Nelson conducted against Copenhagen, or such as that with which, in later days, our operations on the coast of Syria were performed, she would quickly destroy or put them to flight; but, unfortunately, our foes are as well up as we are to all methods of attack and defence. When, however, they do come, they will have guns which can throw shot and shell effectively against floating batteries and forts on shore, and vessels whose armour-plated sides can resist steam-rams and all ordinary shot and shell.

Our business is, therefore, to find guns which can penetrate the thickest armour with which our foes can furnish themselves, and to manufacture armour for our vessels which the guns of our foes cannot penetrate, and to put our guns and armour into vessels which, for our harbour and coast defences, can be easily moved about: and, with regard to our sea-going ships, so to construct them that

they may be able to cross the ocean in all weathers, and to afford a tolerable amount of comfort to those living on board.

The Americans were the first to build ships on some of the proposed plans. Among these was the *Merrimac,* an iron-coated steam-ram corvette, built of wood. What she could do she showed in her combat with the *Congress* and *Cumberland,* Yankee line-of-battle ships. She steamed up towards the first, delivering her fire with awful effect, and then proceeding on towards the *Cumberland* turned deliberately round, and ran into her near the bow, ripping an enormous rent in her side, and hung on by her own sharp prow, while she fired into the fractured chasm. Then she backed out and repeated her tremendous onslaught and fierce fire, and the fate of the *Cumberland* was settled. Still that ship fought bravely, pouring in tremendous broadsides, but with little or no effect, till she began to settle and heel over, and finally went down with her colours flying, we believe. The *Merrimac,* having finished the *Cumberland,* attacked the *Congress* with shells, having taken up her selected position. Her fire was awful. The first shell she threw burst inside the hapless *Congress,* and killed every man at one of the guns. Shell after shell, sometimes two at a time, burst among the crew, till the ship was a complete slaughter-house, the

deck strewn with seamen driven from their guns mutilated in every horrible way, or writhing in agony. The ship, too, was on fire. The shells had kindled the woodwork in several places; nearly all the guns were dismounted; the bulkheads were blown to pieces; rammers and handspikes shivered; the powder-boys all killed. The inside of this ship looked like the inside of a burnt and sacked house. Everything was in fragments, black or red, or burnt, or bloody. The horrible scene lasted for about half an hour. The survivors then struck their colours. The ship, already on fire, continued to burn, and blew up during the night. This is the treatment which every wooden ship, let her be ever so large or powerfully armed, meets with when attacked by an armour-plated vessel. The *Merrimac* was a wooden ship, armour-plated. She was afterwards attacked by the iron-built, also armour-plated, *Monitor*, and not till after a battle of some hours did she retreat, having received considerable damage, while the *Monitor* remained uninjured. The conclusion to which these examples would lead us is, that armour-plated ships are the most invulnerable, that wooden armour-plated are the next, and that wooden ships, for the purposes of warfare, are valueless. If, however, guns can be made to send their shot through iron armour-plated ships as easily as through wooden armour-

plated ones, then it is very possible that the wooden ships may, after all, be the best. This is actually the case. Some of the best invented guns send their shot with such mighty force that, point blank, nothing can resist them, and, therefore, an armour-plated wooden ship armed with them is a match for any iron ship which does not possess them. The objection to wooden ships is, that splinters fly from them when struck, and injure the crew, and that they are more liable to be set on fire than iron ships. They are, however, stronger and more buoyant; besides which we have some hundreds already built which can be converted into armour-plated ships.

It being settled that all fighting ships must have armour of some sort, the question to be decided was as to the best sort of armour—whether turret-ships or broadside-armoured ships. The shield invented by Captain Coles consists of a common turn-table, on which rests a gun-carriage, so that the gun may be turned round on the centre in any direction. This turn-table carries a shield, or shot-proof protection, round with the gun. The shield may extend circularwise all round the gun and turn-table, and may be open entirely at the top for the sake of ventilation, or may be closed in where exposed to vertical fire. This is an excellent device when only one or two guns are concerned, because one very small opening

is sufficient to allow the muzzle of each gun to protrude and deliver its fire; and, as this hole can be turned round in every direction, the interior is safe from the enemy's fire except when the ports are turned in the direction of the enemy, when, of course, they are liable to admit shot and shell as any other opening of equal size. The advantage of thus being able to sweep the horizon without exposing the men and gun to the enemy's fire, is for one or two guns, and perhaps for a couple of turrets, a great advantage; but when more turrets are placed on a ship's deck, they interfere with each other, and of course the masts and other parts of the ship come in the way of their fire.

Coles's shield also shelters only the guns and the gunners; it neither protects the ship, the boilers, the engines, nor the rest of the crew. It is merely an armoured gun-carriage. We have seen, by the example of the *Congress* and *Cumberland*, what would be the fate of a ship with unprotected sides. To render a turret-ship, therefore, of use, her sides must also be protected. Now the weight of the turret and armour-plated sides together would be so great that the speed of the ship must be greatly lessened, if she is not rendered altogether unfit to go to sea. The conclusion we, therefore, arrive at is this—that if means can be found to train the guns fore and aft, and to elevate and depress them on the deck of an ordinary armour-plated ship, it

will be far better to dispense with the turrets. That this can be done most effectively we shall have to show presently by an invention of Captain T. E. Symonds, R.N. These shields, the invention of Captain Coles, R.N., to whom great credit is due, can be closed all round so as to form a complete turret, and can also be covered with a shell-proof roof at the top, when they become properly cupolas. The latter seems the most effective form where weight is no consideration. The simple turret is the most objectionable; a shell thrown into it would, of course, kill all within. The shield or screen is lighter than the turret, inasmuch as there is less of it, but will only be of use against one enemy, or in attacking stationary defences. Regular cupola-ships are, therefore, preferred, and some fine ones have been constructed; but the question is, not whether cupolas are effective, but whether ships provided with them are, at the same time, good sea-going, fast craft, and whether their sides are sufficiently protected against shot and shell.

The fact is, that less weight of armour-plating than that of a number of cupolas, and the sides protected, as of necessity they must be, would allow of a far larger and more effective battery on the ship's deck than that which the cupolas can supply. The following account of the American *Monitor* will give a very good idea of a turret or

cupola-ship. Her fate, however—for she went down with all hands—does not make her more of a favourite with sea-going men. She was, however, hurriedly built, and there is no doubt that turret-ships may be constructed far superior to her; but then they must be of a very large size, disproportionate, indeed, to the number of guns they carry. The following is an American account of the *Monitor*, and will give a very good idea of two turret-ships. Captain Coles proposes to build them with four or six turrets.

"As we approached this naval wonder, I was struck with the pertness of the Norfolk description of her, as 'a Yankee cheese-box on a raft.' It gives a better idea of her appearance than any of the engravings or descriptions in the New York papers. They all fail to afford a correct idea of the general appearance of the vessel, and especially when she is in action. She is oval-shaped, 172 feet long, and 41 feet in width at the centre. Her hull rises perpendicularly out of the water, as straight all round as the sides of a stone wall, as flat on the top as a table, without any rails or guards around her. She has two square smoke-stacks, about seven feet in height, but in time of action these are removed, and the smoke and steam come through grates in the deck, the iron of which is about three inches thick. Nothing remains on the deck but the pilot-house, which is a square

iron structure, about three feet high, about the size of an ordinary dry-goods box. When walking her deck, although anchored at the end of Hampton Bar, where the sea is quite rough, not the slightest motion of the waves would be felt. Her deck is as firm and steady as a rock. The tower rises about nine feet from the deck, and looks, when close to it, like a large iron gas-meter, or gas-holder. On closely examining it, however, you find that its sides and top are about one foot thick, while the whole tower is twenty-two feet in diameter, and it has two oval-shaped port-holes close together on one side, not more than two feet apart, and not more than three feet above the deck.

"The interior of the tower exhibits still stronger the superior strength of the vessel. There is a solidity about it that makes the thought of any earthly power disturbing its movements, or penetrating its interior, simply ridiculous. An examination of this part of the vessel explains the confidence which the officers and men have in her entire and complete invulnerability. They say, 'We fear nothing from land or water, and are ready, whenever the order is given, to proceed to Norfolk or Richmond.'

"The guns sit side by side in the centre of the tower, and are intended to be fired simultaneously, the close proximity of the muzzles of the two guns enabling the two balls to strike the sides of the

enemy in similar proximity to each other. The moment the guns are fired, two immense pillars of steel on the inside, about six feet long, two feet in width, and one foot in thickness, slide before the port-holes, completely closing them, and protecting the gunners from the balls of the enemy."

We now come to a description of what constitutes an iron-clad. The immense weight of the armour has induced the architects in some instances to cover only the sides of the ship with it, so that the bows and the sterns are left unprotected. This has been done to enable the ships to retain their swiftness and sea-going qualities.

The larger and longer the ship, the more complete can be the armour, and the more powerful the armament; and it therefore follows that small iron-clads are objectionable for sea-going ships of war. The armour consists of plates of iron six inches thick, in some instances placed against backing of teak. With this shield the sides of the ship are covered from the upper deck some feet below the water. The finest iron armour-plated ships were the *Warrior* and *Black Prince.* They are 310 feet in length, 58 feet in breadth, 33 feet in depth from under main-deck, and 6,038 tons, builder's measurement. They are built with a set-off to receive the armour-plates for about 200 feet of their midship length, and extending from the gunwale to five feet below water, with

eighteen inches of teak backing interposed between the armour-plating and the skin of the vessel. They have thwart-ships bulk-heads of similar armour and construction, thus rendering this portion of the vessel shot-proof. They have great speed, but they are imperfect, inasmuch as they are not completely armour-clad, and, like a knight without a helmet, they are very likely to have their heads knocked in. The *Warrior* carries 900 tons of coal,—that is, fuel for five days; she carries 28 guns, or 14 guns a side, in a shot-proof battery, and is placed among the class of frigates. A ship to carry 40 modern guns on one battery should be 425 feet in length; but still a more perfect ship, to carry 50 guns, should be still longer, and little short of 10,000 tons burthen, armour-plated from stem to stern. It is a question whether it is wise to armour-plate the fine parts of the bow, as the so doing adds very greatly to its weight, and as no men could be stationed within, in action, the injury it might receive might be counterbalanced by the advantage of lightness. Still the great desideratum is to get sea-going, fast, handy ships, in a complete suit of impregnable armour from stem to stern. This may, however, be accomplished with respect to the ships intended for the defence of our coasts and harbours. One of the chief dangers to the screw is that of getting fouled by the rigging when shot away,—that is to

say, by getting the ropes when towing overboard entangled in it. To prevent this, hollow masts of iron have been made, down which a considerable number of the ropes lead, while wire rope is as much as possible employed. Captain Coles proposes tripod hollow iron masts, with platforms on them, on which riflemen may be placed. They are far stronger and more durable than common masts, and of course no lower standing rigging would be required for them, while a larger part of the running rigging would be protected within them. As they would be fitted with Cunningham's patent self-reefing topsails, no man need go aloft to shorten sail in action.

Still there is another class of ships to be considered. England possesses a vast fleet of wooden ships, sound and strong. Are they to be useless, sold or broken up, or are they to be rendered serviceable for the defence of the country? A plan has been suggested by Captain Symonds, R.N., to render the whole of them serviceable, on what he calls his "end-on and broadside principle." He divides them into two classes,—that is, "harbour and coast defence ships." He proposes to *rasé* a line-of-battle ship to her lower gun deck; the sides are then filled in, and covered with thick armour-plates. An iron deck is put overhead. The chief feature in the battery is the shape of the ports, which are somewhat like the embrasures of

a stone fort, small on the inside and widening in every direction outside, while they can be closed by shutters hauled up with tackles directly the gun is fired. The end-on ports are on a very ingenious and very simple plan. In either side of the broadest part of the bow "indents" are made in which ports are pierced for guns pointing right ahead, and on either quarter also indents are made for guns to be trained aft. Those ports give an arc of 90°, whereas the old port gave only 60°.

To explain the plan better, take a model vessel, cut parallel with the keel a slice out of the deck from the broad part of the bow, and then cut a notch at right angles to it; the gun is placed where the notch is cut. These end-on guns are worked within the armoured bulk-head on the deck of the broadside battery. A ship may run up towards an enemy either afloat or ashore, firing her bow guns, move round delivering her broadside, and then retreat, if necessary firing her after guns, presenting a small target to the foe. All the guns can be so depressed as to fire into a fleet of boats or rafts attempting to board, or, when rolling in a sea-way, to fire her guns when an ordinary ship could not do so.

For the coast defence, the ships' bows and sterns are not fully armoured, rendering them thus able to keep the sea in bad weather. For harbour defence they are covered all over with plates, whereby

greater endurance is obtained, though speed and seaworthiness is lost. The sides of the ships are made to incline considerably. The deck, composed of strong iron beams, is also inclined, and it is covered with iron, backed by teak, the centre part being fitted with iron bars to insure ventilation. He proposes to fit them with 300-pounders, now in use. In some cases he places a gun right ahead, over the stem, and another in the centre of the stern. The guns also can be so trained that three forward and after guns can concentrate their fire on an object 100 yards off, a point of the greatest importance. For the coast defence, ships are put on two keels under the bilges, and bolted to corresponding internal keelsons, the deck being supported by fore and aft bulk-heads resting on these keelsons. The mode of propulsion which Captain Symonds proposes to adopt is that by twin screws, on a principle designed by himself, by which the propelling and manœuvring power is much increased. We began our account with a description of the first screw invented. We have seen the immense progress made since those days. It is now found that two screws are superior to one. They have separate engines placed on either side of the centre keel, and work before the rudder, so as not to interfere with that important part of the ship. They are lower down, and therefore less liable to injury, than the single screw. Being

smaller, the wells for lifting them up are much smaller, and can be completely closed when they are not used. The screw also being lighter, is more easily lifted. One may be injured, and the other escape injury. One may be used when working off a lee shore, under sail, with good effect. But their chief excellence consists in their power to turn the ship rapidly round as if on a pivot, a most important object when manœuvring in action. A large ship can, indeed, turn on her centre in three minutes and a half, whereas to get a large single screw ship round by wearing, sometimes several miles are run over before it can be accomplished. Another advantage is, that a vessel can be steered by means of the two screws, should the rudder be injured, or the steering apparatus be shot away, or otherwise put out of order. There are two methods of fixing the twin screws: one by brackets to the keel—hitherto generally adopted in merchant vessels; another, advocated by Captain Symonds, at the end of a side keel, made hollow, so that the screw can be lifted up through it.

It is proposed in these ships to carry iron telescope masts, the topmast and top-gallant-mast to be in one, and to slide down into the lower mast.

A ship will have four such masts. They are to be of greater diameter than ordinary masts, that a less quantity of lower rigging may be sufficient to support them.

Among the great improvements of the age, we must not forget to mention Mr. H. D. P. Cunningham's patent self-reefing topsails. The head of the sail is secured to a roller under the topsail-yard. As the yard descends, which it does by its own weight, when the halliards are let go, this roller revolves and winds up the sail on itself. Then the sail can be hoisted, lowered, furled, or reefed entirely from the deck without any one going aloft. He has also invented an apparatus for working guns, called his "patent training gear." It is simple in the extreme: two men can turn a large gun from extreme right to extreme left in a few seconds, in a way which before required eight or ten men to accomplish.

We have not yet mentioned all the marine monsters which have been invented. The *Great Eastern* has long been an accomplished fact. She has done a great work in laying the Atlantic cable in a way no other ship could have done, but in other respects she, from her size, has been a trouble and vexation of spirit to all those who have had anything to do with her. A ship in the shape of a cigar has been built, but her superiority over other forms of naval architectural design has yet to be proved. More than one ship has been designed to move both ways, with a screw and rudder at each end, and a beak into the bargain, somewhat after the plan of Lord Dundonald's *Janus*,

which was, however, a paddlewheel vessel, as the screw was not, I fancy, then brought into notice.

Steam catamarans have been built to move under water, but they have been found to be far more dangerous to those on board than to the enemy. The Americans built one if not more turret ships with the deck flush with the water, but it was found that those who manned them would have to sing "de profundis" to a certainty, if they venture out of their rivers, and that they were ticklish machines even in smooth water.

What the future may bring forth it is impossible to say, but we have arrived at one conclusion, that large armour-plated ships are the best, and till they can be constructed it is expedient to alter our wooden ships, and to cover them entirely, or in part, with iron plates which cannot be penetrated by shot or shells. We have not entered into a description of the fearful missiles of modern warfare. The effect of the bursting of one shell inside a ship is terrific in the extreme, but when we hear that such things are now filled with molten iron, which spits liquid fire about in every direction, the contemplation of the suffering and agony to which a crew so attacked are subjected is perfectly appalling, and must make us more desirous than ever to be well-armed, in order that we may awe the pugnacious, and keep at peace with all the world.

The following account of the *Royal Alfred* gives us a good description of that ship, and at the same time affords us a sample of the history of many of our ships of war at the present time :—

"The *Royal Alfred* iron-plated ship of war has been called the finest broadside armoured man-of-war in her Majesty's Navy. Indeed, excepting her speed, we have no armour ship to match her in the British Navy. She is certainly not perfect, because many faults are apparent which could easily be remedied in the construction of another similar vessel. Her quarters, in the first place, could perhaps be successfully attacked by gun-boats heavily armed, while she would be comparatively powerless to reply. Her rudder is somewhat exposed, her beam is remarkably broad; but she is lower between decks than other iron-clads, especially the *Bellerophon.* She has greater beam than the latter, but less height. The *Royal Alfred* is more heavily armed than any ship in the Royal Navy. She carries in a central battery ten 9-inch rifle shunt guns, each weighing 12½ tons, mounted on service carriages and slides.

"In addition to these ponderous cannon, she mounts eight 7-inch rifle shunt guns, of 6½ tons each. The latter guns are disposed of in the following parts of the ships: two abaft the battery, two before, all on the main deck; two on the quarter deck, and two on the forecastle. Mr. H.

D. P. Cunningham's patent training gear has been applied to work two of the large guns. The apparatus is simple, and calculated to save labour; indeed, two men, working this gear, can turn a gun from extreme right to extreme left in a few seconds. If the apparatus works well, it will doubtless be brought into general use where it can conveniently be applied. The armoured man-of-war, christened after the Royal Sailor, was originally laid down as a two-decker line-of-battle steamer. At the time she was being built iron-clads were first introduced, and the original design was abandoned. She was cut down, lengthened thirty-four feet amidships, and afterwards six or seven feet were added forward. The form of her bow was also altered, and in lieu of the original stem, she had given her a bluff bow above water-line, running finer below. Thus modified, she was launched on the 15th of October, 1864, at Portsmouth Dockyard. Her hull is of 8-inch plank to the top side; on this is fastened 6-inch iron armour amidships, the thickness being reduced to four inches at the fore and aft ends. She is fitted with 800 horse-power engines manufactured by Messrs. Maudslay, Sons, and Field, of London. These are the old-fashioned double piston-rod direct engines, with common condensers, and are very good of their kind, although not to be compared with the more modern machinery fitted

on board the *Bellerophon.* As a fighting armoured ship-of-war, the *Royal Alfred,* despite shortcomings, is one of the most efficient, if not absolutely the finest ship in the navy. She was designed when Mr. Watts was chief constructor, and Admiral Sir Baldwin Walker Comptroller of the Navy; the original design was, of course, abandoned to a certain extent, and then followed a series of alterations and adaptations. Her steering qualities may be described as good, although greatly inferior to the *Bellerophon,* and inferior to the *Lord Clyde.*

"Having on board 515 tons of coal, twelve months' provisions and stores, ammunition, and about 600 officers and men, she draws 23 feet 9 inches forward, and 27 feet aft."

Among the numerous huge monsters constituting the iron-clad fleet of England, the *Minotaur,* a portrait of which forms the frontispiece to this volume, is one of the most gigantic and formidable; and the sister ships, the *Agincourt* and *Northumberland,* all of precisely the same tonnage, power, rig, and equipment, are the largest and most powerful ships in the navy.

The *Minotaur* was built at Blackwall, by the Thames Ship Building Company, and the engines were constructed by Messrs. Penn, of Deptford.

She is 6,621 tons' measurement, and propelled by screw engines of 1,350 horse-power, with a speed of 15 knots an hour.

She is 400 feet in length by 59 in width, and carries in all thirty-four of the heaviest guns as yet used afloat. Among those which form her chief battery on the main deck are four 300-pounder Armstrongs. On the forecastle she carries two heavy guns, protected by an iron shield, which can be trained either to act as bow chasers, or to sweep the deck, fore and aft, in the event of her being boarded by an enemy.

She is what is called frigate-built, and the midship port cills are ten feet above the water.

She is completely built of iron, even to the upper deck. The bow is constructed on the ram principle, with a swan-breasted stem protruding some distance under water.

For more than two-thirds of her broadside, to 5 feet below the water-line, her sides are covered with iron plates, 5½ inches thick, between which and the hull is a 10-inch teak wood backing.

As the plates approach the stem and stern they taper off to a thickness of not more than two inches, which gives greater buoyancy to the extreme ends of the vessel.

As the ends are thus more vulnerable than the sides, and a raking shot coming in might sweep the deck, fore and aft, iron-plated bulk-heads are placed athwart ships so as completely to inclose the main battery. There are sliding doors, which are of course open when the ship is not in action.

There are also waterproof compartments, so that, should the ship be injured in one compartment, the water cannot penetrate beyond it.

She has a vast number of contrivances for facilitating labour. Among the most important is Cunningham's gear for working heavy guns —before described. A more complicated style of machinery was tried on board her, but failed; whereas Cunningham's, from its simplicity, has proved itself eminently successful.

In consequence of her great length, it was necessary to fit her with five masts. All her lower masts are of iron; four are square-rigged, and she carries divided topsails. Her masts are distinguished as foremast, mainmast, after-mainmast, mizenmast, and after-mizenmast.

She appears to best advantage when under sail, and then looks what she is, a fine powerful fighting, sea-going craft. She was the flag-ship of the iron-clad squadron during the visit of the Sultan and of the Pacha of Egypt to Spithead, and is the flag-ship of the Channel squadron, though intended for the Mediterranean.

## CHAPTER VIII.

### ENGLISH MERCHANTMEN AND FISHING VESSELS.

No nation in the world possesses so fine a fleet of merchantmen as the English, although among them there are certainly many ugly, slow-sailing, ill-formed craft.

THE HONOURABLE EAST INDIA COMPANY'S SHIPS.—The largest ships were those of the old East India Company. The profits which fell to the share of the captain alone, from a few voyages, often made his fortune. They were generally commanded by gentlemen whose families had interest with the Company, and young men entered the service with the expectation of obtaining commands. They were of 1,000 tons and upwards, and carried several guns. One of which I have spoken, the *Glatton*, when bought into the navy, mounted fifty very heavy guns. This will give a notion of their size. They fought several actions with the ships of the enemy; and a fleet of them made so warlike an appearance on one occasion, that they kept at bay a large French squadron.

FIRST-CLASS MERCHANT SHIPS.—However, these Company's ships, as they were called, no longer exist, and their place is supplied by others sent to sea by wealthy ship-owners, such as the Messrs. Greens, the Wigrams, Dunbars, and others. These ships vary in size from 500 to 1,000 tons; some even are 1,500 tons burthen. I believe, however, that the greater number do not exceed 1,000 tons, as moderate-sized merchantmen answer best. They are ship-rigged; have a deep hold; a lower deck, where are cabins for passengers, officers, and sometimes the crew, and where the lighter articles of cargo are stowed. They have all poops, under which are the cabins for the chief passengers, the captain's cabin, and the saloon. In large passenger or emigrant ships, the whole of the between decks is devoted to passengers. Generally speaking, they have topgallant forecastles, or a deck forward, raised above the deck, under which there are berths for the crew. The greater number sleep in standing bed-places, or berths, arranged round the forecastle. Properly speaking, the commander of a merchantman is called the master, but in courtesy he is called captain. He has three or more mates, called first officer, second officer, third officer, and so on. Large ships have also midshipmen, who are, properly speaking, first class apprentices, and who pay a premium on going on board, under the understanding that they are to be taught their

profession. They carry a surgeon, and sometimes a purser, or supercargo; but generally the duty he would perform is attended to by the captain. These ships carry a few guns on the upper deck—those especially trading to China do so; but under ordinary circumstances they are used only for firing signals. They are rigged in most respects as I have described men-of-war; but their masts are lower and their yards are not so square—that is to say, not so long. Indeed, their sails are generally smaller, in proportion to their size, than those of men-of-war. Merchantmen are often fitted out by a person who is called the ship's husband. He buys all her stores, sees that she is in good seaworthy order, superintends her fitting out, and indeed manages all her affairs with the affectionate care of a husband, till she is ready to receive her cargo. Ship-brokers collect that from different mercantile firms who may have goods to ship, and arrange about her passengers. Sometimes one mercantile house engages her entirely,—charters her is the term. They pay all the freight. The term freight stands here for the sum to be paid for carrying the cargo. They ship all the goods themselves, or get other houses to do so. Ships are consigned to a mercantile house at each of the ports where they are to go. The duty of that mercantile firm is to sell the cargo, or to hand it over to the merchants for whom it is intended.

They also are expected in every way to attend to the interests of the ship, and to obtain, if possible, a return freight, or to advise the master where to go to obtain one. Very often the master is part owner of the ship, or owns her entirely, and perhaps the cargo also. He then goes to the port where he expects to sell the cargo to the best advantage. Formerly, when English mercantile houses were not so generally established in all the ports of the world, a supercargo was sent out in each ship, often one of the partners of the firm which shipped the cargo. He went where he thought best, sold the cargo when and to whom he judged advisable, and bought a cargo in return. Now, however, supercargoes are seldom required.

INSURANCE OF SHIPS.—Merchantmen and their cargoes are insured by the owners and the shippers of the goods; that is to say, they pay a small premium to a certain number of wealthy people, who agree to pay them the value of the ship and cargo should she be lost, or part of it should she or it only be damaged, so that they may not suffer loss. The chief insurance-office is over the Royal Exchange, called Lloyd's, after the name of the person who first established it. Here the insurers or underwriters sit in a long room, and those who wish to insure go to their desks, and name the ship and the sum for which they wish to insure. These gentlemen write their names for part of the

sum under the name of the ship; hence they are called under-writers.

All ships are classed according to their age and general condition, A 1 meaning that they are in the best order, A 2, A 3, and so on; B means that, though seaworthy they are not fit to make a long voyage.

EMIGRANT SHIPS.—Of late years many ships have been employed exclusively in carrying emigrants from England; though they have, when they could obtain them, returned with cargoes. They sail chiefly from London, Liverpool, and Glasgow, though a few go from Bristol, Dublin, Hull, and a few other ports. They vary from 400 to 1,000 tons; some are 1,500 tons. They have a good height between decks, or what may be called the lower deck. The fore-part of this is fitted up for single men, the centre part for married people with children, and the after-part for the single women, who have, in the best-regulated ships, a matron placed over them. Among the married men two or more are selected as constables to keep order. These ships have all a high poop deck, under which are the cabins of all the first-class passengers and the saloon, with the captain's cabin. In many ships the after-part of the lower deck is fitted up with cabins and a saloon for the intermediate class passengers. All ships carrying above a certain number of passengers are compelled

by law to have a surgeon on board if crossing the Line. The ships I speak of go to Australia, New Zealand, and the Cape of Good Hope. Commissioners have been appointed by Government to superintend emigration; they are called Her Majesty's Emigration Commissioners: they have done much to mitigate the evils which formerly existed in consequence of a number of people being crowded together on long voyages,—no vessel with emigrants can leave an English port without being visited by one of their officers; they also charter vessels, and send out emigrants to the colonies I have mentioned. The emigrants are placed under the entire command of a surgeon, styled the surgeon-superintendent. Many of these officers go backwards and forwards, as do the matrons in charge of the single women. Many ships fitted as I have described sail also to the British North American provinces, and to the United States. Merchant ships carry their larger boats stowed on deck between the booms, as also quarter-boats, and a stern-boat hanging by davits over the stern. They are ordinarily called the long boat, launch, cutter, and gig. They also often carry a whale-boat, which is a boat suitable for heavy seas, and, both ends being alike, is lowered with less risk in a hurry. The cooking-house is on deck, and is called the caboose.

BARQUES.—I have described barques as having

their fore and main masts square-rigged, and the mizenmast like that of a schooner, with fore and aft sails. They seldom much exceed 300 tons. They are more easily managed than ships, or even than brigs, as their sails are generally smaller, and a large number of merchantmen are of this rig.

BRIGS.—More moderate-sized merchantmen are of this rig than of any other; vessels of 120 to 250 tons are generally thus rigged; they are all flush-decked vessels. Many trade to foreign countries, especially those which have to go up narrow rivers, or enter narrow harbours, as they can work more rapidly than ships. Many are very beautiful vessels; a large number of coasters, colliers, and others are thus rigged; but their yards are short, and they are far from graceful-looking craft. Coasters are so called, because they sail from port to port along the coast, and do not cross the Channel or go to any foreign port. Their masters, though they are good seamen, are often perfectly ignorant of navigation,—that is to say, they cannot take an observation with a quadrant. They sail by dead reckoning—that is, they find how fast they go with the log, while the compass shows them the direction in which they have gone. Thus, when they lose sight of land, they can easily get hold of it again.

SCHOONERS.—There are a good many vessels

bound to foreign ports especially up the Mediterranean, and some few to the coast of Africa, rigged as schooners, and very fine-looking craft they are. A considerable number of small coasters are rigged as schooners or brigantines. I have described a brigantine as having the foremast like that of a brig, and the mainmast like that of a schooner. They are, on account of the mainmast being schooner-rigged, more easily handled than a brig; often vessels of 100 tons go to sea with only a master and three men. One of them sails as mate, and is able to keep a watch.

SLOOPS OR SMACKS. — They are among the smallest class of coasting vessels. Sloops have one mast and a short topmast, with a bowsprit which steeves,—that is to say, rises,—and a jibboom. They have a large fore and aft mainsail and gaff topsail, but also a square topsail, and sometimes a topgallant sail and a lower yard rigged across. Smacks have running bowsprits,—that is to say, their bowsprits can be rigged in; but they also carry square topsails. Some are rigged as yawls, with mizens, either lugs or gaffs. All these smaller vessels are steered simply by the tiller, without the assistance of a wheel. Tiller ropes are, however, fastened to each side, by which the helmsman more easily moves the tiller. They carry their boats on deck, or hanging over the stern from davits.

KETCHES.—I have already described their rig. Some employed in river navigation have taunt mainmasts, with a narrow fore and aft mainsail and gaff topsail. They are very easily handled.

BARGES.—Few people would suppose that the flat-bottomed craft, so low, so gaily painted with green and red and yellow and blue, so deep in the water, without any bulwarks, and with a great hatch running fore and aft, would venture out of the smooth rivers in which they appear built solely to swim. Yet I have met them some way from land, and making coasting voyages of a hundred miles or more in length. They are rigged forward like sloops; but sometimes their mainsail is set up with a long spreet, which is raised or lowered with a tackle, and when sail is to be taken in it is brailed up. They do not draw much water, being quite flat-bottomed, and they have little or no keel; but they carry a large lee-board, which on a wind is let down to prevent them from driving to leeward. So little above the water are their gunwales, that it appears as if the sea must inevitably wash over them. They are in many respects an imitation of the Dutch galliot or dogger. The master nearly always carries his wife and family with him. His barge is their only home; there the children are born, and there they live from one end of the year to another—perhaps not going on shore for weeks together, though close to the land, and seldom,

even in their most distant voyages, out of sight of it. One of Captain Marryat's heroes, Jacob Faithful, is described as born on board a river barge; and very faithful descriptions of the style of life led by bargemen are introduced into that most amusing work. Most of these vessels have tanned sails, and are very picturesque-looking craft.

CUTTERS AND YAWLS.—A few trading vessels are rigged as cutters and yawls.

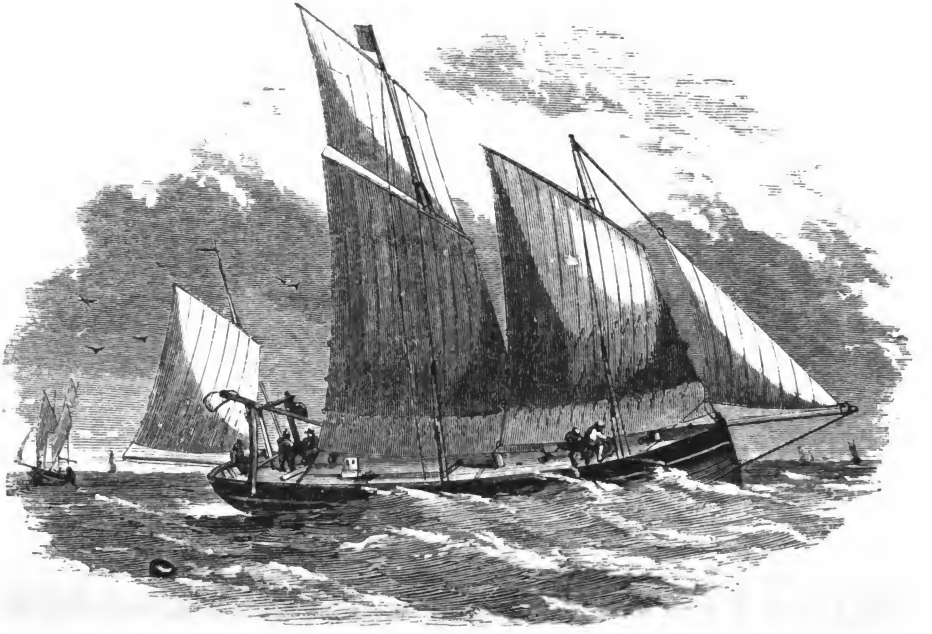
FISHING VESSELS.—A very large number of vessels are employed in this occupation. The finest are the Yarmouth trawlers. They are cutters of from forty to seventy or eighty tons, and each carry from eight to ten men. Two or three persons or firms own each as many as 100 and even 150 of these vessels. They belong, however, chiefly to ports in the Thames, though they are stationed at Great Yarmouth. They go out together, in fleets of 100 to 150 vessels; and some fish off the Texel, and others 100 and 200 miles off the land in different parts of the North Sea. They are provided with large trawls, which are nets attached to beams. These are let down by strong ropes to the bottom of the sea, and dragged after them, they being under easy sail. The nets have large bags or pockets, into which the fish are forced. Turbot and other flat fish are caught in this manner. The vessels remain out

six weeks together, without once returning into harbour. It may well be asked, how do they manage to do this? what becomes of the fish they catch? Besides the fishing vessels, there exist a fleet of tenders. There exist also on the banks of the river Yar large ice-houses, in which ice is preserved all the year round. The tenders are employed constantly going backwards and forwards between Yarmouth, the fleet, and London. They take in a cargo of ice and provisions and water at Yarmouth; this they carry on to the trawlers. The fish caught in the meantime have been kept alive in tanks in the trawlers' holds. They are now packed in baskets with ice, properly numbered, so as to be known; and the tenders, which are fast sailing cutters, carry them away to the fish salesmen in Billingsgate market, and in another day or two they are dispersed all over England. At the end of six weeks or two months the trawlers return into port, where they remain to refit, and refresh the crews, for ten days or a fortnight, and then away they go again to the fishing ground. A hard life they lead, for they fish all the year round; summer or winter makes but little difference to them. The crews of these vessels have been very much neglected, and have been looked upon as an extremely reprobate class of men. Happily, however, the blessings of the Gospel of Peace have been carried among them.

One of their own class, the mate of one of the trawlers, was the first missionary. He preached the Gospel ably; he was the means of distributing tracts and circulating some good religious books, and now, out on the stormy waters of the North Sea, a flag is hoisted; and when the vessels can communicate with each other, the crews assemble on board one or other of the cutters, and Divine Service is held, prayers are offered up, hymns are sung, and sermons read by these lately rough and thoughtless men. Each fleet is under the oldest and most experienced master, who is styled the admiral. One of those early turned to a knowledge of the truth was the admiral of one of the largest fleets, and his example had a powerful influence on others. In his fleet, in a short time, the masters and crews of thirty vessels refused to fish on Sunday, although the practice of fishing as usual had hitherto been common.

FISHING LUGGERS.—A considerable number of large luggers belong to Great Yarmouth, and the places to the north and south of it. They vary in size from twenty to forty or fifty tons, and carry crews of from seven to ten men. They are engaged in the herring fishery off the Norfolk and Suffolk coast, and often much further north. They fish with seine nets, or wall nets which are let down at night and hang from corks straight down, the lower part being sunk by leads. The herrings,

swimming at night in shoals just below the surface, swim against them. The nets are lifted in the morning; the herrings are taken out; the nets are mended, and again let down. The vessels are fitted with lockers at the sides, in which salt for curing the fish is carried. There is a well in the centre into which the fish are thrown on being taken out of the nets, other lockers in which the cured fish are packed, and a curing-room. Here some of the crew are employed in cleaning and salting the fish caught during the night, while others stow it away. The crew live in small cabins aft and in the fore part. They return into port once every week, and sometimes oftener. Many have now given up fishing on a Sunday, and go into port every Saturday. A fine old fisherman remarked to me, "I've done so, sir, ever since I was a boy, and I'm certain I've never lost anything even in this world by obeying God's law. I've always got my nets spread out and dried on the Saturday evening, and have had the whole Sabbath to rest and prepare myself for the toils of the week. How much wear and tear is saved! At the end of the year, too, my nets are stronger and better by far than are those of men who have toiled on every day without distinction. Look at me, sir; I am as hale and strong as many a man ten years younger; and those young men, my sons, what fine lads they are, sir! Another thing, too: in one year with



LUGGERS

another, I've caught and sold as many herrings as any one else, and am in no way poorer. Yet often I have had to lose the best part of two days in the week to keep to my rule." These were the exact words of one of the finest old fishermen I ever saw, whom I met not long ago on the Norfolk coast. His six sons were with him. He was part owner of a fine Yarmouth lugger, which he and they manned. I give a drawing of one of these vessels. They are called luggers, from the form of the sails—lug sails—which they carry. They have three short, stout, lower masts; and sometimes, as the one before us, carry a main-topmast, which slides up and down, and can be easily lowered. The mizen-mast is stepped very much aft, like that of a yawl, and has a bumkin or outrigger. They carry a bowsprit and jib. The framework in the after-part of the lugger in the cut is for spreading the net. She is on the port tack close hauled. When going about, they have to lower or dip their sails, or the sail would be against the mast. This is the chief objection to them, as they require a good many hands to work them. As a large crew is required for hauling the nets, this in fishing vessels is of no consequence. No vessels sail closer on a wind, or are better sea-boats, from having no top hamper.

HERRING BOATS.—A large number of fine open boats, with very great beam, belong to fishing

villages all along the coast of Scotland and Northumberland. They carry seven or eight men, and are generally rigged as cutters or yawls. Cutters with small mizens are often called dandy-rigged vessels. Their nets are similar to those used by the luggers. They put down their nets in the evening, and hang on to the end of them during the night. As I have been sailing along the coast I have often heard their little tinkling bells, and seen the small light of their lanterns, which are held up to give notice of their whereabouts. Still, in spite of great care, they are frequently run down by the numerous steamers and other vessels passing up and down the coast. Most of the Scotch fishermen come into harbour on the Saturday forenoon, that they may have time to dry their nets and get any repairs done before Sunday, and they do not go to sea again till Monday morning. Thus they lose two nights in the week when they might be fishing. It is only thus that they can obey the law of God to keep holy the Sabbath, and I am very certain that they are in consequence blessed in their vocation. They are a very steady, respectable class of men; and their example has had a considerable effect upon the English fishermen.

SMALL FISHING BOATS.—A considerable number of small spreet-sail fishing boats fish off Yarmouth for herrings.

TORBAY TRAWLERS.—These are cutters from

twenty to forty tons and upwards. Their sails are generally tanned, and they have a very picturesque appearance. They return to port every day. Large vessels with wells, into which the salt water constantly flowed, and in which the fish were kept, used to sail up and down the coast, taking in the fish caught by the Torbay men; but now the fish are sent off at once by railway to London.

WHALERS.—Two classes of whalers' ships sail from English ports.

The GREENLAND WHALERS sail chiefly from Newcastle, Hull, and other ports on the eastern coast of England and Scotland. They go in chase of the common, true, or Greenland Whale, which yields the whalebone as well as oil.

The SOUTH SEA WHALERS used to sail from London, Liverpool, and Bristol for the Pacific and South Atlantic, and remained out two or three years. They went to collect sperm oil, the produce of the spermaceti whale, and differed in many respects from the former class. Of late years, however, the greater number of English vessels engaged in the sperm-whale fishery are fitted out at Sydney, in New South Wales, and none sail from English ports.

The Greenland whaler claims our first attention.

These vessels are very strongly built, to withstand the pressure of the ice to which they are often exposed up Davis' Straits; measure from

300 to 400 tons; are fast sailers, and usually barque-rigged. Their bows are doubled or trebled; that is, they have one or two additional layers of planks on the bows, and are fortified in other ways with ice-stems and ice-knees of iron and oak. The ice-knees are angular blocks, filling the space formed by the stern and bow planks; they decrease in thickness till they are incorporated with the common doubling below the fore-chains. The hold-beams are placed low, that the sides may better withstand the pressure brought against them, and thus afford also a larger space between decks. The crew sleep in standing bed-places. They number from forty to fifty hands. A whaler carries six boats, which are hung up in a line of three boats on either side, and are always kept ready for lowering at a moment's notice. As the greater part of the crew of a whaler are frequently away together in the boats, it is important that she should work easily with few hands. Her courses are therefore cut narrowing towards the foot, and are often fitted with booms below as well as above. This boom is secured by a tackle to the deck, and, as it swings with the yards, requires no tacks or sheets. In tacking, or when the sails must be backed, which it is often necessary to do suddenly when sailing among the ice, they are very useful. The crew consist of harpooners, boat-steerers, line-managers, coopers, carpenters, fore-

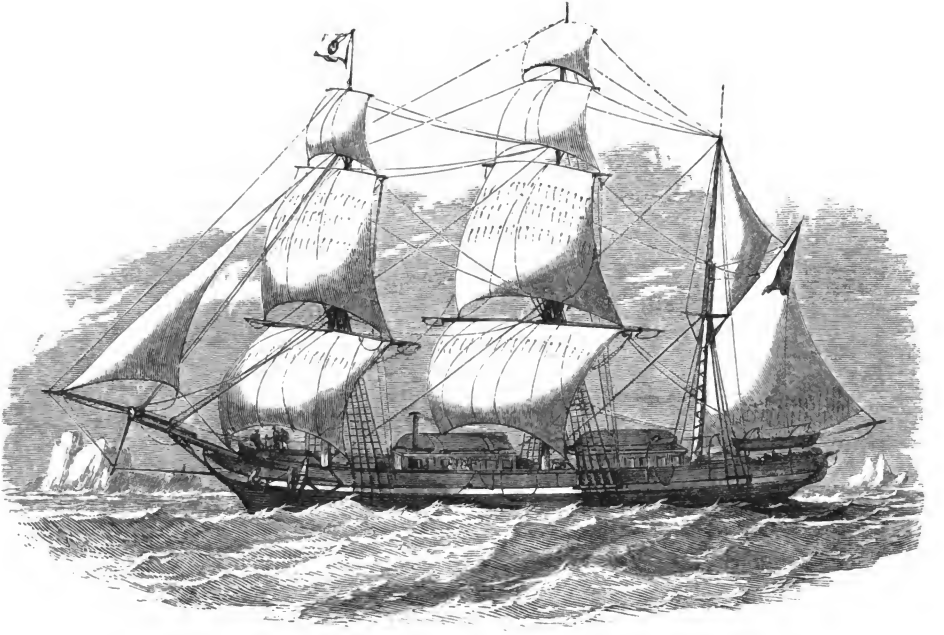
mastmen, landsmen, and apprentices. All have a certain share on the profits of each whale caught. As it is important to keep a bright look-out, both for whales and to avoid ice, a cylindrical screen, called a crow's nest, is fixed on the maintop-gallant masthead. It has a seat and a place for a telescope, speaking trumpet, and a flag, &c. &c. Here one of the officers takes his post, as soon as the ship enters the regions where whales are to be found. Without this shelter, no man could long endure the icy cold wind of those high latitudes. Nearly all the Greenland ships touch at the Shetland Isles to complete their crews, and leave that island about the end of March. Interesting as an account of the whale-fishing would be, I have not space for it; my province at present is simply to describe a whaler and her boats. The bow and stern of a whaleboat are sharp and very similar; but the stern narrows more rapidly than does the bow. They are carver-built, very strong, their planking of fir, and their timbers are formed out of straight-grained oak, bent by steam into the required form. They are called according to their size—four-oared boats, six-men boats, and six-oared boats. The latter carry six men who row, one of whom is the harpooner, and the steersman. They are generally twenty-six to twenty-eight feet in length, and about five feet three inches in beam. In the two larger-sized boats the beam is about three-sevenths of the

length of the boat, but in the smaller it is rather less than one-third. It is necessary to have the smaller boat wider, because otherwise it might be too easily dragged under water. The five-oared boats are most used on ordinary occasions. The boats are furnished with harpoons and lances. The harpoons are now frequently discharged by means of guns, but they are difficult of management, and the old harpooners prefer the weapon to which they have been accustomed. Each of the boats carries six whale lines 120 fathoms in length, which, when spliced together, make 720 fathoms, or 4,320 feet. These six lines are all coiled away with the greatest neatness in separate compartments. All the lines have eyes spliced at each end that they may be the more easily united. The harpoon has a piece of rope, called a foreganger, secured to it; it is then said to be spanned. The upper end of the first whale-line is connected with the foreganger, and the harpoon is then ready for use. Each boat is supplied with two harpoons, six or eight lances, five to seven oars, a flag called a *Jack*, to show as a signal when a whale is harpooned; a rest called a *mik*, for supporting the stock of the harpoon when prepared for service; an axe for cutting the line if necessary; a bucket for baling out the boat, or wetting the lines as they run out, called a "pigging;" two boat-hooks, a grapnel, a mallet, fid, "snow-shovel," "swale," "spare

tholes," "a snatch-block," "grommet," &c. &c. Every article must be arranged in a whale-boat for instant use; the axe being ready to cut the line, should it foul, or should it be necessary to cut clear of the whale. A whale-boat is steered by an oar instead of a rudder, as she is thus more easily turned, or can be sculled through a narrow passage, and does not retard the progress of a boat as the rudder does. A whaler's crew are separated into divisions equal to the number of boats carried by her. Each division thus consists of an harpooner, boat-steerer, line-manager, with three, or four, or five rowers. The harpooner has command of the boat, and, when in pursuit, rows the bow-oar. One of the mates, or the captain himself, acts as harpooner; the boat-steerer ranks next to him; and the line-manager takes the third place.

The Greenland whale-ships, unless frozen up, as frequently happens, return home in the autumn, touching, as in their outward voyage, generally at Shetland on their way. They are thus engaged but a very few months in the year in the fishing, but during that time, even if the crew escape being frozen up, or having their ships crushed by the ice, the hardships and dangers to which they are exposed are very considerable. I must now go on to give a description of another class of whale-ships.

SOUTH SEA WHALERS.—These vessels are employed chiefly in the capture of the sperm whale, or spermaceti whale, which is known by its vast size, its huge head, and blunt flat nose. The ships are generally from 300 to 500 tons. The Americans send out a far greater number of vessels than the Australians to prosecute this fishing; they carry from thirty to thirty-six men, and are provisioned for three years; sometimes they remain out for a still longer period than that. They always carry a surgeon. They are not so strongly built and fortified as the Greenland whalers, as they are not exposed to the pressure of the ice in the same way; indeed, they mostly prosecute their vocation in high and warm latitudes in the Pacific and Indian Oceans, though some go far south to the borders of the Antarctic Ocean. They are mostly, like the Greenland whalers, rigged as barques, with sails which may be easily handled. A whaler returned from a long voyage, battered and weather-worn, her long line of boats hoisted high up over her quarters, and her sails patched and stained, has a very antique and picturesque appearance, somewhat like the ship of the Ancient Mariner Coleridge writes about. Each ship carries six boats, at least; they are from twenty-six to thirty feet long, by four to four and a half in beam, sharp at both ends, and the bottom has a hollow, to enable them



SOUTH-SEA WHALER.

more rapidly to turn; carver-built, light and strong.

The logger-head, an upright piece of timber, is placed at the after end; and at the bow is a groove through which the harpoon line runs out. They carry two lines of two hundred fathoms in length each, coiled up in tubs, four harpoons, three lances, a keg, in which are stowed a lantern, tinderbox, and matches; also in the boat there are three flags, called "whifts," to be inserted in the whale when killed, and two drogues, or quadrangular pieces of board, which are attached to the whale-line, to impede the progress of the whale when running away, or sounding. Each boat carries a crew of six men, including the headsman and boat-steerer. The headsman has the command of the boat; he steers it till the whale is struck by the boat-steerer, who pulls the bow-oar. He then changes places with the boat-steerer, who comes aft, while the headsman (who is either the captain, or one of the mates) goes forward, ready to plunge his lance into the whale, as opportunities may occur. The boat is steered by an oar, which passes through a grummet at the stern. A look-out is kept all day, when in the latitudes where whales are to be found, by men stationed at each mast-head; while an officer is posted on the fore-top-gallant yard for the same purpose.

As the flesh of the sperm whale could not be kept till the ship makes harbour, the oil is extracted from it on board the ship; this process is called CUTTING IN and TRYING OUT. The whale is brought alongside the ship at sea, and secured; men then descend, with instruments called spades, on the body of the whale; the head is first cut off and secured astern; that alone contains a large quantity of sperm oil, which is baled out of it. The body has tackles hooked into it, and by this means it is turned round and round, while the crew with their spades proceed with the process of flaying. The sheets of blubber taken off are known as blanket-pieces. Large caldrons are placed on deck, into which the blanket-pieces when cut up are thrown; and the odd bits serving as fuel, the fires are lighted on platforms under the pots. The oil, when extracted, is stowed away in casks; the spermaceti oil from the head, being the most valuable, is boiled and stowed away by itself. One whale will produce as much as eighty barrels of oil, and the whole is tried out and stowed away three days after the capture of the whale. A South Sea whaleman has peculiar charms to those inured to hardship and toil and danger, on account of the great variety of countries visited, and the strange scenes often encountered; but, generally speaking, the crews of these ships are a peculiarly rough and

untutored class of men, and often prefer leaving the ship before she returns home, to roam for years and years among the islands of the Pacific, till they almost forget their native land, and all they once cared for there.

## CHAPTER IX.

### ENGLISH YACHTS AND BOATS.

WHO that possesses an eye for anything nautical cannot at a glance distinguish the graceful, trim, well-found aristocratic-looking yacht from a crowd of other ordinary vessels? The English have had pleasure-vessels for many ages back, but it has been during the last half-century that they have increased so rapidly in numbers. The possession of yachts by gentlemen of fortune gave rise to the yacht clubs, and the yacht clubs have again very much tended to the increase of yachts and the encouragement of yachting generally; as also, by establishing regattas and sailing matches, to the improvement of their build. Indeed, I have no doubt that their improvement has tended in no small degree to that of ship-building generally, and that it is owing to the fast sailing yachts that we have now so many fast sailing or clipper merchantmen, which were a few years ago unknown.

I will first give a passing notice of the yacht clubs of Great Britain. They consist of an assemblage of gentlemen owning yachts to whom Her

Majesty has been pleased to grant peculiar privileges, and for whom she has obtained them from other countries. These clubs have mostly houses where the members meet; they have their distinctive flags—burgees they are called. The members have a uniform, and their officers wear a crown-and-anchor button and gold lace to their caps. Their vessels have the privilege of men-of-war, and may enter any English or foreign port without paying harbour dues, and, unless they take a pilot on board, without, I believe, paying pilotage. The oldest, most wealthy, and the members of which have on an average the finest yachts, is the Cowes Yacht Club. West Cowes Castle is their present club-house. They established the first and most popular regattas, and perhaps no more animated scene of nautical life can be witnessed than on a fine morning of the principal day of Cowes Regatta, when hundreds of vessels of all sizes and classes are collected together to take part in, or to witness the amusement. The late Lord Yarborough was one of the chief promoters of this club. It was his great pride and amusement, and he was for many years its commodore. He owned one of the largest private yachts ever built—a fully-rigged ship called the *Falcon*, of some 400 or 500 tons burthen. She carried a crew of from forty to fifty men, and everything on board was carried on in man-of-war fashion. He was a very good sailor

himself, but his ship was generally commanded by a naval officer. He, during the latter years of his life, sold the *Falcon*, and built a large first-rate sea boat of some 200 tons or more, rigged as a yawl or ketch, and called the *Kestrel*. He went out in her to the Mediterranean, in consequence of illness. At length, while in Malta harbour I think it was, he felt himself growing worse. He ordered that his vessel should put to sea. It might have been that he thought the sea-air might revive him, but I am inclined to believe that, animated with the spirit of the old Norse sea-kings, of whom he was a worthy representative, feeling his death approaching, he felt a longing to breathe out his last breath amid the wide blue ocean, which he had from his boyhood days so well and firmly loved. He was indeed the worthy representative of the true British yachtsman. Lord Wilton, the owner of a very beautiful schooner, succeeded him as commodore. Some of the yachts of the club have cruised through the Pacific even towards the North Pole; visited the shores of America and the Black Sea; and one, owned by the noblest man of all, Sir James Brooke, the *Royalist*, went out to Borneo and took part in deeds which may well immortalise her master's name. I was with him on board her just before he sailed; and though he spoke of visiting those far-off Indian islands, and I told him how delighted I should be to accompany him,

little did I think at the time of the gallant exploits he was about to perform—of the wide-extended benefits he was to be the means of conferring on many thousands of the human race. Among those who have contributed to the improvement of yacht-building, Mr. Weld, of Lulworth Castle, stands conspicuous. Who that knows anything about yachting has not heard of the *Arrow*, the *Lulworth*, the *Alarm*, and other vessels built by him, each superior to the former, and nearly always beating all antagonists in the race. However, with the *Alarm* he appears to have reached the utmost extent of his powers of invention. He proved what was before doubted, that the larger vessels are, to a certain extent, the more rapidly they are able to move through the water. The *Arrow* beat the *Julia*, one of the first vessels he built, the *Lulworth* the *Arrow*, and the *Alarm*, larger than all, beat the *Lulworth*. The *Alarm*, which is upwards of 200 tons, requires as a cutter a mainsail of such extent, that she has of late years been rigged as a schooner, and is thus much more easily handled.

The Royal Victoria Yacht Club at Ryde is next in importance to that of Cowes, and as I was one of its first members, I have always taken a great interest in it. The house, which is a very excellent one, built for the purpose, is to be seen on the right of the far-outstretching Ryde pier. A very good feeling existed among the members, and a

most pleasant club it was. Mr. Ackers, the owner of the magnificent three-masted schooner, or rather ship, the *Brilliant*, was for many years the commodore. The first commodore was Thomas Willis Fleming, one of the most active founders of the club. The *Brilliant* was not inferior in size to the old *Falcon*, and a far more graceful and remarkable craft. What other nation in the world possesses a number of pleasure vessels fit to sail round the world at a very few days' notice?

Southampton boasts of a yacht club. Many of the owners of the vessels are members of other yacht clubs. They have a very nice house near the pier.

The Western Yacht Club is one of the oldest, and numbers a good many fine vessels. No harbour on the coast is more suited for sailing, nor can exhibit more beautiful scenery than that of Plymouth.

Both the Thames Yacht Club and the Harwich Yacht Club have many fine and fast vessels, and several are fitted with auxiliary steam-screws.

The Kingstown Yacht Club in Ireland has long been established, and possesses many fast vessels, which have made voyages to Iceland, Norway, and other distant ports. There is a club, I believe, at Cork, and one on the Clyde, and there are, I believe, one or two others of minor size on different parts of the coast.

I have, of course, been speaking of the salt-water yacht clubs. There are numerous boat clubs in

every part of England, wherever there are rivers on which boats can float. Oxford, Cambridge, and Eton may well boast of their aquatic sports on the Thames, the Isis, and the Cam; and there can be no doubt that the taste there obtained, when more developed, contributes not a little to England's naval supremacy, by the encouragement given to ship-building, to yachting, and to our glorious navy.

To these have lately been added a Canoe Club, brought into prominent notice by the exploits of the well-known owner of the *Rob Roy* canoe, John Macgregor, Esq.

Yacht clubs have contributed to the establishment of regattas in nearly all the ports of Great Britain and Ireland. There is scarcely a harbour or roadstead in which an annual regatta does not take place. Let us take another glance at Cowes Roads on the morning of a regatta, while the preparations are making for the race. There are, perhaps, a hundred or more beautiful vessels at anchor, measuring from four hundred down to twenty-five tons, or less. Some not intending to sail are gaily decked with flags. Others have their snow-white canvas fluttering in the breeze—their huge wide-headed gaff topsails and balloon jibs ready for hoisting. These are the racers. Others, with more moderate-sized canvas, are receiving their visitors on board. Yachts' boats, the men in white shirts and straw hats, and the gold lace of the officers'

caps glittering in the sun, are pulling here and there with eager haste, as if some important action was to be fought. Perhaps they are only going to carry a note to another yacht, or to bring off a lady's cloak. The shore is crowded with people. Gay bands are playing; carriages are driving in; and everybody looks excited and busy. Spy-glasses are in great requisition. The blue Solent sea is covered with the white sails of small vessels, many of them full of people coming from all directions to see the race. People begin to look at their watches; the gigs pull about still more furiously; ladies and gentlemen are hurrying off to various yachts. Eight or ten splendid-looking craft are arranged in a line outside the rest, and off the club-house, with their distinguishing flags flying at their mastheads. A gun fires. The yachtsmen are more on the alert than ever. It was the signal for the racing vessels to get ready. Another gun is heard. Up go the balloon-jibs! The vessels' heads pay round. There is a fresh breeze, but not too much. Like magic, a white sheet of canvas is now extended on their taunt-masts, and away they dart, as birds on the wing, sometimes first towards a vessel moored off Yarmouth, in sight of Hurst Castle, at other times round the Nab Light, off St. Helen's, at the other end of the Isle of Wight. Fast as they may go, what with the tide against them, and often light or contrary winds, it is late in the

afternoon before the course is accomplished. In the meantime, fishing-boats or pilot-boats may be started, or boat-races may be taking place. The boats have either one hand in each, or they are fast gigs, each manned by four men, all of whom are dressed alike, though the uniform of the various boats may be different;—some have on white, or blue, or red, or checked, or striped shirts. Each boat is known by its distinguishing flag. The signal is made, and away they go! The men exert themselves as if the fate of nations depended on the issue. They have a long pull, but the course is so contrived that they are always in sight of the club-house, or some part of the esplanade. Not the least part of the entertainments of a regatta is the DUCK HUNT, as it is called. A man in a small punt, with a huge cocked hat, and dressed in some fanciful costume—the more burlesque the better—is pursued by three, or four, or more long four or six oared galleys or gigs. If he was to venture into the open sea, he would be caught immediately; but he keeps, therefore, among the yachts in the most crowded part of the harbour or roadstead. In, and out, and among them, in every direction, he artfully dodges, while the long boats dart after him. They think they have caught him, but he has again sculled behind a small vessel, and they have to take a long sweep before they can reach the spot. He meantime has paddled away; is

grinning at them round the bows of another vessel ahead. The more crowded the harbour, the better chance he has of keeping up the sport, and the greater number of spectators he has. He must, however, be an expert boatman to escape the rushes and the rapid onward movement of the gigs. They depend on speed to overtake him, he on twisting and turning; indeed, to escape altogether, he must be a perfect specimen of an "ARTFUL DODGER." The day generally terminates with an illumination of the yachts, and a fine display of fireworks afloat. When the *Brilliant* has all her ports lighted up, and a line of blue lights burning along her bulwarks, the effect produced is very beautiful; and then numerous other vessels follow her example, till the whole roadstead is blazing with light, till at last only the port-fires are left burning, and then it appears as if only so many phantom barques were floating on the calm waters of the Solent. There is generally a grand club-dinner, and a ball another night at the club. The amusements of the regatta are, however, it must be understood, spread over several days. Generally one day is devoted to a schooner race, and this lasts usually longer than any other.

I must now describe the different classes of vessels which are used as yachts. Except the *Brilliant*, and I believe the old *Falcon*, which are frigate-built,—that is, with a main and upper deck,

—the main deck being fitted up with cabins, all English yachts are flush-decked vessels.

The larger class are chiefly brigs or schooners, ranging from one hundred and fifty to two hundred and fifty tons; some are, I believe, even larger. There are a good many schooners from one hundred and fifty tons down to seventy and even fifty tons; but the greater number of yachts of one hundred and twenty tons, and downwards, are rigged as cutters or yawls. The *Alarm*, though two hundred tons or more, is yawl-rigged. There are, indeed, as many schooners of one hundred and twenty tons as cutters of that size. For going foreign, a schooner is more convenient, as being more easily handled than a cutter. The greatest number of cutters are to be found among vessels of from fifteen to fifty tons. I have known several vessels of forty tons rigged as fore and aft schooners, and very fine sea-boats they make, though they are not so fast as cutters of the same size. Neatness and efficiency is the great characteristic of English yachts at the present day. Their bottoms are covered with bright copper; the rest of the outside is black; and the inner part of the bulwarks and companion-hatch skylights are generally light salmon or buff, perhaps picked out with some other colour, but generally plain. There is brass-work, kept beautifully bright, but very little carving, except perhaps the tiller-head, or wheel. Now and

then there is a red or a gold ribbon outside, but not often. The interior fittings are equally characteristic of good taste. Abaft the companion-ladder there is, perhaps, the ladies' cabin, with two or four berths or separate cabins opening out of it. Then, before the companion-ladder, there are, if the yacht is of any size, two side sleeping-cabins; then, perhaps, the main saloon, extending the whole width of the vessel, or with berths at the side, or cabins opening from it; and then, perhaps, more sleeping-cabins, with a passage leading forward to the steward's pantry and the kitchen, which is, in a yacht, always below. There are now first-rate sea kitchen-ranges invented, in which dinners for a large number of people may be cooked. Before that, again, there are the cabins for the master, and mates, and steward; and then there is in all yachts of any size a good, long, airy fore peak, in which the men's hammocks are slung. An owner with right feelings will always see that his men are properly berthed. The main cabin has generally sofas on each side, and a swing table, with racks for glasses, bottles, &c. over; a sideboard at one end. I have seen pianos on board yachts, and, indeed, everything on a small scale which is found in a house, so that families with ladies have made long voyages in them, and lived on board throughout the year. Of course, the fittings of yachts differ so much, that it would be

difficult to give a full description of them. Some owners are all for plainness and neatness: they only care for what is good and strong. This is certainly the best style for small vessels, for in them paint and varnish very quickly get rubbed off. Others, again, have their vessels fitted without sparing expense, and very handsome they are. Of one thing there can be no doubt, that mahogany and other ornamental woods are the best suited for cabin fittings, as a little oil and rubbing soon makes them look clean and handsome; the light woods are, however, the most pleasing to the eye. Glass handles to the doors are pleasanter to the touch than brass. Wooden handles are the best. I must not, however, enter into particulars. Racks for arms, speaking-trumpets, spy-glasses, charts, bookcases, &c., may be arranged round a cabin, and add much to its neatness without increasing in any way the expense of fitting up.

I will arrange the yachts under the following heads:—

SHIPS.—Two or three, there may be.

BRIGS.—Four or five, if so many.

SCHOONERS.—Of all sizes, perhaps one hundred.

CUTTERS.—Innumerable, taking all belonging to clubs or not.

YAWLS, OR DANDY-RIGGED VESSELS.—A quarter or sixth of the number of cutters. A good many of the Thames and Harwich Yacht Clubs' vessels

are thus rigged. It is a convenient rig for working on the river, though, of course, when running, a yawl cannot set so large a spread of canvas as a cutter. A dandy-rig is another name for a yawl.

THE THAMES HATCH-BOATS, a very fine class of boats, are rigged as yawls. Many of them are used as yachts. They are low in the water, have great beam, are long, and are very fine sea-boats. This boat has water-ways, like a barge. A long hatch runs fore and aft, forming a good-sized cabin; and in fine weather, when the hatches are off, the centre part of the boat is almost open. There is generally a place, often called a well, for the helmsman and two or three people to sit; it is only suitable for a very rough style of yachting in fine weather.

STEAMERS.—A considerable number of yachts of all sizes are now fitted as steamers; a very few have paddle-wheels. Most of them have auxiliary screws, and are fully rigged as square top-sail, or fore and aft schooners. Mr. Ackers has a new screw steam-yacht called after his former vessel, the *Brilliant*, of upwards of 400 tons. Lord Cardigan has a fine steamer of 300 tons and more. An auxiliary screw, especially, must often prevent a great deal of vexation when the vessel is caught in a calm, and people are on board who are anxious to get into port. At the same time, with a steamer, a great deal of the uncertainty and

excitement of yachting is lost, when a screw is ready to twist a vessel into harbour at any moment.

From yachts I will pass on to a description of the various boats used along the coast of England. Of these none surpass

THE RYDE WHERRIES.—They are boats entirely open, thirty feet long, or more; eight, or even nine feet in width; sharp at both ends, and with high weather-boards. They have a little part forward covered in, and have thwarts, or seats, placed across for nearly two-thirds of the distance from forward. There are seats fore and aft in the body of the boat for passengers. They are steered by yoke-lines instead of a tiller. A yoke is a long or rather semi-circular piece of flat board fitted to the top of the rudder, with ropes fastened to either end, called yoke-lines; thus, by pulling one line or the other, the rudder is turned as by a tiller. If you wish the vessel's head to go to starboard, you pull the starboard line, and *vice versâ*. A back-board divides the passengers from the after-part of the boat, where the waterman sits or stands. These wherries are rigged with a spreet mainsail and large spreet mizen, and a jib. I have seen very large ones with a gaff mainsail and jib, as well as foresail, and some even have been decked over, but their superior qualities as sea-boats have thereby been considerably damaged. Their numbers have considerably decreased in consequence of the steamers,

by which everybody now goes backwards and forwards to the Isle of Wight.

PORTSMOUTH WHERRIES.—These differ very much from the Ryde wherries. They are very much smaller, and are exceedingly low in the water, but are higher and broader than the Thames wherries. They are rigged with main and mizen spreetsails and foresail. They are well suited for pulling, and sail well also on a wind. They are extremely light, and dance gaily over the seas, but they are easily upset, and scarcely a year passes but what one or more are upset, and the people in them drowned, going to or returning from the ships at Spithead.

WHITE'S LIFE-BOATS.—Mr. White, at Cowes, has built some very beautiful life-boats, and rigged them with large latine sails. They have great beam, are covered in, surrounded by water-tight compartments. They sail excessively fast, and will live in any ordinary heavy sea, when a common boat would founder; but I am not aware that they are so well suited for the usual objects of life-boats, which are to be hauled up on a beach, launched through a surf, and pulled off amid breakers and cross seas to a ship on the rocks or on a sandbank, over which the sea is washing furiously.

GALLEYS AND GIGS.—Galleys are boats not belonging to vessels, built like gigs, clinker fashion, rather higher than gigs perhaps. They are used by the Revenue service, when they are painted white,

not to be seen at a distance on the water when there is a fog; indeed, a white object on the water is not seen either by night or day at so great a distance as a dark one. Smugglers used to employ galleys of the same description, sometimes pulling eight or ten oars. The best OARS are made of ash, but as they are expensive sometimes they are made of pine. For sculls, pine serves well enough, but they are apt to warp.

DEAL BOATS.—The boatmen at Deal have long been known as the most hardy and bravest of their class along the coast of England, while their boats are among the finest anywhere to be found. Numberless have been the crews they have rescued from the dangerous Goodwin Sands.

LIFE-BOATS.—South Shields claims the honour of being the place where the first life-boat was invented and employed. A Mr. Wouldhave and a Mr. Greathead were the inventors. This was about the end of the last century. However, neither that boat, nor many others built on a great variety of principles, answered the purpose intended. Numerous life-boats were lost, and their crews, trusting to the qualities they were supposed to possess, were drowned. At length, in 1849, a crew of twenty brave fellows were lost in a life-boat, attempting to save the people from a wreck off the river Tyne in Northumberland. This, and many similar catastrophes, induced the philan-

thropic late Duke of Northumberland, who, a seaman himself, did so much for the welfare of seamen, both temporal and spiritual, to offer a prize of a hundred guineas to the inventor of a life-boat which, after due examination by a competent committee, should be considered the best. Nearly three hundred persons sent in models and plans. Mr. Beeching, of Great Yarmouth, obtained the prize, as the model he submitted was considered superior to all others, and I believe that it has not yet been surpassed. I saw one built after this model some years ago at Great Yarmouth, and a magnificent boat it is. In shape it is something like a gigantic whale-boat, but higher in proportion to its length. It is 36 feet in length, 9½ in beam, 3½ in depth, and pulls 12 oars double banked. A cork fender, about eight inches square, runs round the outside a few inches below the gunwale. Air-cases placed in all the vacant spaces give it additional buoyancy; and both forward, and aft where the boat rises somewhat, there are short decks with air-cases under them. This gives a buoyancy or floating upward tendency of upwards of eight tons, counteracting to the same extent the weight or downward pressure of the boat and her crew. The boat has a heavy iron keel which serves as ballast, and besides there is an assemblage of separate water tanks, which can be filled or emptied easily by means of pipes made to contain any quantity

of water up to two tons. If the boat is capsized, the light air-cases at the gunwale have of course a strong tendency to rise, while the iron keel and cases filled with water have a tendency the other way, viz. to sink. Thus, without any effort of the crew, the boat rights herself. She has indeed very little chance of going over. The crew either lash themselves to the thwarts, or there are beckets, that is to say loops, fastened all the way round the boat, by which they may haul themselves in. This boat was rigged with a lug mainsail and mizen, and could set a foresail. With thirty persons on board, she draws two feet of water. One of the peculiarities is that the water is let out of the bottom of the boat by valves, so that she speedily not only rights herself, but frees herself from water. She weighs with her fittings about three and a half tons, and each boat costs about 250*l.* She is capable of carrying fully seventy persons. Captain Charlwood, of the Navy, made the first experimental trip, in the first boat built after Mr. Beeching's plan, with a crew of sixteen picked hands, and pulled in a variety of directions through a terrific surf, breaking at the time on the Goodwin Sands; since then she has been tried on numerous occasions, and found to answer in every respect. I have also seen some other life-boats constructed to right themselves, but their bows and sterns rise very high out of the water, and hold so much wind that they must very

materially impede the progress of the boat when pulled head to wind, and make it at all times difficult to steer her.

On the beach at Great Yarmouth, in Norfolk, a number of very fine boats are to be seen. The finest are what are known as Yarmouth Yawls. They measure from fifteen to twenty tons. They have very sharp bows, but draw very little water forward; their extreme beam is some way aft, and they narrow away aft with a remarkably sharp run. They carry a mainsail, foresail and mizen, and are supposed to be the fastest boats on the coast.

THE COBBLE, OR COBLE.—Off the coast of Northumberland, I have frequently seen pilots put on board the vessels from the most curious style of boat, which they called a cobble. She is very deep forward, with a deep, broad stem, but she narrows and rises aft, her keel at the same time diminishing till she has no keel at all, and very little depth. She would thus have no hold of the water, and would be utterly helpless in a sea, had she not a very deep rudder, which goes a long way down below her bottom, and has thus a powerful hold of the water. She carries one large lug sail, which is hoisted and lowered in an instant. No better sea-boats exist, or more capable of standing the rough weather of the German Ocean. Floating, as the stern does, just on the surface of the water, it rises

immediately when a sea strikes it, at the same time that the rudder, from its length, retains its hold on the water, and the boat continues to be steered properly. Also, when it is necessary to beach the boat, the sail is lowered, the rudder unshipped, and she is pulled in stern first. Having so deep a stem, she has a great grip of the water, and thus sails very close to the wind. Her ballast is, of course, chiefly forward, but she requires very little. As the fore part has little to drag after it when once it has divided the water, she sails very fast, both on a wind and before it. Indeed, probably no boat for the purpose possesses so many good qualities as a sea-boat, or a beach-boat. She has not capacity, however, and cannot carry many people, or much cargo; in smooth water other boats might beat her. I do not fancy that she can be a good boat for pulling; yet, for what she is wanted, she is admirable, viz., for beaching, for sailing fast and close-hauled, for living in a heavy cross sea, and for going alongside a vessel; yet she requires delicate handling, and only those accustomed to her are fit to go in her.

THE CORACLE.—You may be surprised to find the coracle mentioned among the boats of the present day, yet I have myself seen it on the river Wye, in South Wales, and I have heard of it on some of the rivers on the east coast of England. It consists of a large wicker basket, with a hide

signals, and must be of great val
man is stationed on the poop wit
the books and flags near him to
to the signals when in company
he is called the signal midshipm
to give you an account of all the
men; they are stationed in th
are reefed or the ship is put a
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GUNS.

Ships of war are armed
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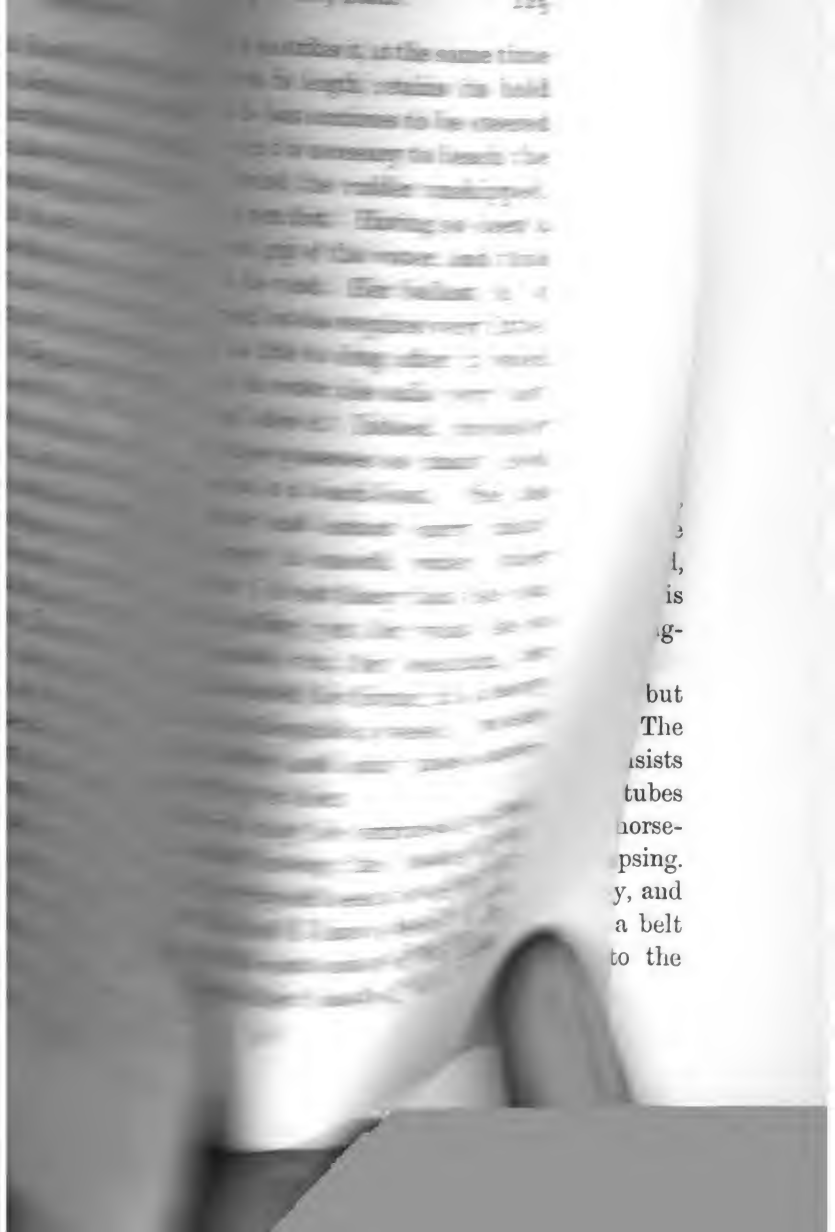


stretched over it, or rather, I should say, that the frame-work of the boat is made of wicker, and that hides, neatly sown together, are stretched over it to serve instead of planking. It is the identical craft which was used by the Ancient Britons, when our snug little island was first invaded by the Romans. They probably had them of a much larger size than those at present in use. They are so light that a man can easily carry one on his back. They have a thwart across in the middle, and one aft; in the after one a strap is passed, which, when a man is carrying it, fits over his head. They are paddled like canoes, with single paddles.

THE THAMES WHERRY.—Long has the Thames wherry been celebrated as the boat pulled by the smart young waterman. She is long, low, and somewhat crank; her upper works fall out considerably. She is a very fast boat, and well suited for smooth water. She is generally pulled by two hands, with oars.

THE FUNNY is built like the wherry, but is smaller, and is pulled by one man, with a pair of sculls.

PORTABLE BOATS.—I must not omit to mention a boat invented by Lieutenant Halkett, now Captain, I believe, R.N. It is made of India rubber cloth. The sides are like a huge bladder, which can be filled with wind by a pair of bellows.

Wooden seats fit into straps so as to secure them, as does also a step for the mast, or, rather, for the triangle on which the sail is set, for they can carry sail. They are moved best, however, by a paddle. When inflated, the larger ones carry three men. A man can easily carry one on his back. The same officer invented a boat of this description, which, when not inflated, he could wear as a cloak, while his paddle served him as a walking-stick, and the sail as an umbrella. To the astonishment of some old shipmates, he once paid them a visit on board a man-of-war, and sent away his boat. When wishing them good-by, he was asked if he did not want a boat. "No," he answered, "I shall just go on shore in my cloak." To the surprise of all, he filled his cloak with air, and fitting it up, he begged to be let down in it, when away he paddled, and reached the shore in safety. Such a boat is invaluable in exploring expeditions, and as a fishing-punt is often very convenient.

Life-buoys are made on the same principle, but they are not such as I should like to trust to. The best description of life-buoy is that which consists of a number of small water-tight tubes; these tubes are kept inflated by a small quantity of stiff horse-hair, just sufficient to prevent them from collapsing. I have frequently tried this sort of life-buoy, and have found great buoyancy in it. I have a belt and breastplate made of it, which fits into the

breast of a great coat. I have also a deck-seat, or cushion, made in the same way. I believe the patent is taken out by Messrs. Silver, of Cornhill; at all events, I get my cushions there.

I have not yet described the parts of a boat. The bottom boards are the loose boards for the feet to rest on. The THWARTS are the cross seats. The STERN-SHEETS is the after part of the boat, where the seats are placed against the sides fore and aft. In the after part there is one seat across for the steerer to sit on. THOLES are the pegs which fit into holes in the gunwale, between which the oars work when being pulled. RULLOCKS are square indentations, which allow the oar to slip into them. The part of an oar which works in the rullocks or between the tholes, should be covered with leather, or copper, or served round with line, or it quickly wears out. The upper edge of the sides is called the GUNWALE, but a wash-strake is sometimes put on above this to keep out the seas. The PAINTER is the rope fastened in the bows, by which a boat is towed. The TILLER fits into a hole in the rudder, and is shipped or unshipped. The YOKE is a flat board which fits over the head of the rudder, and lines being rove through the ends, the boat is steered by them. A SHOE or BAILER is used to bail out water. A BOAT-HOOK is a spar with a hook and spike at the end of it.

I believe that I have now fully described the

various sorts of boats to be found on the English coast. There are, undoubtedly, many different names given to boats, but they have no striking peculiarity to distinguish them from those I have mentioned. The Irish hooker is a little rough craft, a cutter, generally known more by her tattered sails, make-shift rigging, than by any other peculiarity; and the same may be said of the craft to be found on the west coast of Scotland, running between the different islands scattered about there. In case my lists should not be complete, I shall be glad to have descriptions sent me of any vessels which I may have omitted to mention.

An account of the well-known *Rob Roy* Canoe, and of some other craft which have of late made their appearance, will be found at the end of the work.

## CHAPTER X.

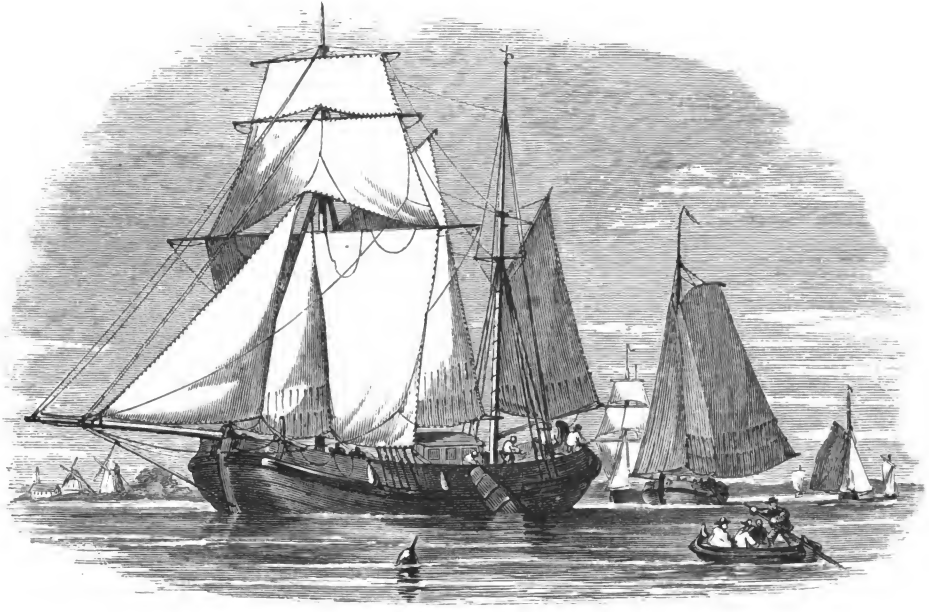
### VESSELS AND BOATS OF EUROPE.

I PROPOSE going round the coasts of Europe, and taking notice of the various craft to be met with on the voyage. We will begin at the north. Russia, as is well known, has copied all her vessels from English models since the time Peter the Great came over to England to study naval architecture in a shipwright's yard. A boat he built with his own hands, and navigated himself, is still shown at his marine villa near St. Petersburg, and called the Father of the Russian Fleet. The only vessels I have seen peculiar to the Baltic are little Finnish schooners, which cruise along the coast, and bring up provisions to the capital. They appear to have no paint and no iron-work about them. They have sails of thin white canvas, and very few ropes; and those are white and free from tar. Altogether they have a most frail and unseaworthy look about them. The Finns, however, are a very hardy race, and the best seamen of all the people under the dominion of Russia. The Russian navy, which began with the one boat built by the Czar, now

numbers no less than 158 men-of-war, many of them ships of the line and heavy frigates; besides which there are numerous screw and row gun boats. The Russians have an ingenious way of raising their large ships out of the water to repair them. As there is no rise and fall of the tide in the Baltic, they cannot place them on shore to examine them. They therefore place on each side of them what may be described as huge boxes, as long as the ship, and of considerable depth. They are called "camels." These are floated up alongside, and being filled with water they sink under her. They are then secured, and a framework of timber is built up and fastened to her. Numerous pumps are now set to work; and as the water is pumped out of the camels the huge ship is thus lifted bodily out of the water, so that she can be replanked even, if necessary. Their very largest first-rates are thus treated.

It is not till we arrive in Holland that we meet with any very peculiar vessels. Galliot, Dogger, Scuyht, are names given to different sorts of Dutch vessels. I will describe the galliot, which may serve as a type of the rest. She is very strongly built with stout timbers and thick fir plank; she has flat floors, and but little keel. There is not much difference in the shape of her head and stern, which are both well rounded, or, rather, the bow may be called very bluff. She has little or no keel, but a

deepish, thick stem, and her rudder is very wide, and is hung outside all. On each side is hung up a huge lee-board to prevent her going to leeward. Her planking is not painted; but after she is caulked it is covered over with a very thick coat of a yellow and peculiarly bright varnish, which shines in the sunbeams. Her hold is very capacious, and the whole of it is devoted to cargo. She has high bulwarks; and the after part of the deck being sunk slightly, a wooden house with arched roof is raised over it, intended for the accommodation of the master and his family. It is remarkable for its peculiarly gay and fresh paint. The windows have Venetian blinds, the doors are of mahogany or other fine grained wood, and the interior is fitted up with a sitting cabin and a number of neat sleeping berths. There is a wide, low, but capacious caboose, and another house forward for the men to live in. The hatchways are long, strongly secured, and the hatches are highly varnished or painted; indeed, varnish and paint are everywhere prevalent. She is rigged something in ketch fashion; she carries squaresails on her mainmast, and a fore and aft mainsail, and a gaff mizen with mizen gaff topsail, and a high steeving bowsprit. Her masts are well scraped and polished, and her crosstrees and mastheads are painted. Her sails are beautifully white or brightly tanned. Altogether, though she looks not entirely unlike a



DUTCH GALLIOT, ETC.

huge Brobdignagian wash tub, which some boy of that giant race has fitted up with sails, she is really a very fine sea-boat. The well-known enterprising blind traveller, Lieutenant Holman, R.N., told me that he, in one of his many voyages, crossed from Rio de Janeiro to the Cape of Good Hope, in a Dutch galliot, when she encountered a very heavy gale of wind, but that she was hove to, and rose like a wild fowl on the waves, and that he never was in a more comfortable sea-boat. Before the wind, considering these bluff bows, they are very fast, in consequence of their drawing very little water; and on a wind, with their lee-boards down. they sail remarkably well. In describing them I ought to say that their upper works fall in, that is, bend in all round very much, just as the upper part of an egg does. Thus the deck is much narrower and shorter than the part just above the water. At the bows and stern they fall in very much more than do any other build of vessel. Thus, the upper works offering little resistance to the seas, they scarcely ever break on board, or carry the bulwarks away, as is often the case with other vessels. An immensely stout wale or girdle runs round the vessel, and binds all the upper timbers together, very much adding to her strength. The great object of the Dutch builders is to give the vessels a capacious hold, and this they do by putting many of the strengthening timbers outside instead of inside

them. They vary in size from sixty to eighty, and even a hundred and fifty tons. Dutch vessels, when larger than that are built like other ordinary merchantmen of Europe, and very fine ships many of them are. Their men-of-war are likewise large and well-built ships, and in the wars in which Holland has foolishly engaged in with England, they have fairly competed with ours, though ultimately beaten. The Dutch navy at present consists of twenty-one ships of the line, and frigates, of upwards of fifty vessels, carrying from four to twenty guns each, and of about sixty gun-boats, and other government vessels. The Dogger is in many respects like the galliot, but smaller and not so much ornamented. Scuyht is Dutch for a boat; and all sorts of small craft are called by that name. The Scuyht met with at sea, is a sloop-rigged decked vessel, built in most respects like the galliot. It is pronounced Schifts—and thus a steam-boat is called a Damp Scuyht. On the Rhine a number of curious vessels are to be seen. The Rhine barge is not unlike those to be seen on English rivers, but is larger, and is remarkable for her huge rudder, and great thick beam serving as a tiller. She carries a very large cargo, and is always well painted and polished.

The most remarkable objects afloat on the Rhine are the timber rafts, which appear like islands, with whole villages on them, taking a cruise. They

consist of logs lightly bound together, and must cover not much less than a quarter of an acre. They have short masts and square sails stuck about them, not only to assist their progress, but to help steer them, while several long rudders are fixed astern for that purpose. There are cottages built about them of rough planks, in which the crew and their families live during the voyage. At its termination the raft is broken up, and the logs are either shipped on board vessels for exportation, or sent to saw-mills for home consumption.

From Holland and Belgium we pass along to the the coast of France. Here luggers of all sizes are prevalent, from open boats to vessels of one hundred and fifty tons and upwards. Some are coasters, carrying on a petty commerce from port to port. A large number are fishing-vessels, and are strongly manned craft. In shape they are long and narrow, with bows bluff above water, though sharp below and flat sterns. This was the favourite vessel used by smugglers, because, as they were able to lower down their lugs while their masts had scarcely any standing rigging, they were often able to escape the observation of the revenue cruisers. In the war time the French had a number of large privateers rigged as luggers, which, from their low masts and light rigging, were often able to lie hid till they could pounce out on their prey. They are also fine sea-boats, and are noted for their fast sailing

qualities. It is a great advantage in a heavy sea for a vessel to have no top hamper, which is the case with luggers. They are suitable, however, only for those classes of vessels in which a number of men can be carried. The French coast-guard vessels, called Chasse-Marées, are rigged as luggers. They are generally gaily-painted craft, with a considerable sheer, that is, the after part and bows rise in a curve higher than the waist or centre part, The rudders are wide, and hang outside. Many quite large craft are almost or entirely open, with only a forecastle, under which the crew sleep. Some way back you will find a print of a lugger, which gives a very correct idea of the sort of craft I have been describing. On the north coast of Spain I can remember no vessels which have any peculiarities. The boats I have seen at St. Sebastian Passagos, Corunna, and Vigo, are large, with stem and stern alike sharp, and manned by strong crews. The oars work on single tholes, which pass through a piece of wood secured to them.

On the coast of Portugal, however, there are a great variety of craft worthy of description. The ships and large vessels do not differ much in appearance from the English. The Portuguese build very fine, long, low, raking schooners, which too often find their way into the hands of slave-dealers, and are employed in the slave-trade. They frequently, for their lighter sails, use cotton-cloth.

THE HIATE.—The Portuguese trading schooners are, however, unlike any other craft. They have good beam, with very short counters; some have round, and others nearly flat sterns. They are either contracted, or fall out in their upper works, which make their hulls look ugly. They are all decked, and vary in size from forty to a hundred and fifty tons. Many of them trade to England, or cross to South America. Their chief peculiarity consists in their rigging. They have only lower masts, which rake at different angles, while the gaffs of the foresail and mainsail hoist to different heights; one being almost horizontal, and the others much more peaked up. They carry fore staysail, jib, and flying jib, or jib topsail, with gaff topsails, and a large square sail and square topsails. Under plain sail, I have never seen a more ungraceful, ugly-looking craft. They are, at the same time, said to be fine sea-boats, and they frequently perform long voyages.

THE RASCA is generally only used as a coasting vessel. I have met with some government revenue vessels, or men-of-war, with this rig. She is long and low, with considerable sheer, low bulwarks, with stem and stern much alike, both being sharp, rising also at each end. She has two or three short stumpy masts raking forward, and on these are set, beautifully cut, latine sails, with long tapering yards, so that, when under weigh she has a pecu-

liarly picturesque appearance. Her upper works fall in very much, and her deck is rounded, so that she appears as if she would prove a very fine sea-boat. Her entire outside is painted black, and generally green or some dark colour inside. When before the wind, latine sails can be set so that the yards cross each other, which has a very picturesque effect.

THE LISBON BEANPOD is the most curious of European craft. I do not know by what name the Portuguese call her. That of Beanpod exactly describes her shape. Take a well-grown beanpod and put it on its convex edge, and then put two little sticks, one in the centre and one at the bows, raking forward, for masts, and another in the bows, steeving up, for the bowsprit, and another astern for a bumkin or outrigger, and you have before you the boat in question. The mainsail is a large latine sail, but it has very little peak, as the upper end extends right aft over the stern of the boat. From the point to the end of the bumkin two triangular sails are set, while from the mast forward a four-sided sail is set; the opposite angles reaching perpendicularly from the foremast head to the heel of the bowsprit, and horizontally from the mainmast head to the end of the bowsprit. Two little square sails are set on the bowsprit, but perpendicular to the water, to act as fore and aft sails. The object of the rig appears to be to keep all the sail as low as possible. The hull is equally curious.

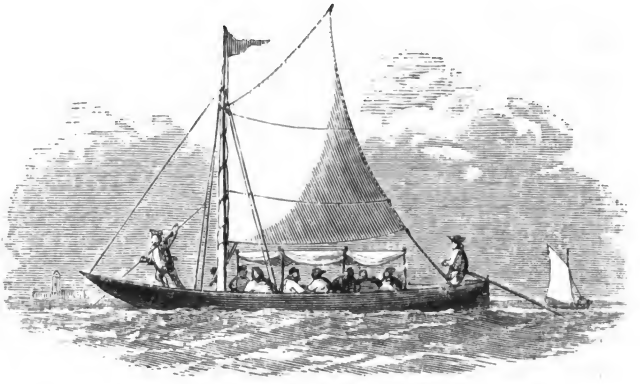
She curves, or rather curls up, at the bow and stern, where the deck—if so it may be called—is completely rounded in, just like the end of a bean; and even in the waist, where there is a deck, it is very narrow. They sail very fast, and close on a wind, and they are employed as fishing-boats, chiefly as trawlers, and are to be seen in numbers off the Tagus, where they have a curious, if not a picturesque appearance.

THE CATRIA, employed by the pilots and fishermen off the Douro, is one of the finest sea-boats I have ever met. She is about thirty feet in length, bows and stern sharp, and the bows like those of a cutter. She is a deep boat—three feet or more, with considerable sheer—completely open, with thwarts for entire length, pulls twelve or sixteen oars, double banked, has a wide and deep rudder, the head of which rises high above the gunwale, so that the helmsman stands up to steer, or sits in calm weather on the gunwale. On ordinary occasions the crew dressed in red caps and sashes and white shirts are noisy enough, but when blowing hard, they all are silent, listening to the commands of their chief. They have visited a ship in the offing, and are pulling in towards the shore, on which a heavy surf is now breaking. There is a bar across the river, which has to be passed. They reach the spot where the huge Atlantic rollers begin to break. Several break one after the other just ahead of

them. Now they pull ahead; now they back to avoid the breakers. At length the largest breaks, and the pilot gives the word. They are to pull for their lives! On they dart; the seas come rolling up astern, but they keep ahead of the breakers. Now the boat rises to the summit of a roller; now she sinks down into the trough of the sea. Advancing or pulling back at the right moment, at length she reaches smooth water in safety. A man-of-war's boat, manned by a fine crew, and many a merchantman's, has attempted to do the same: the boats have been hurled over and over, and all hands have met with a watery grave. The sail of the catria is very picturesque. It is a wide lug, with a very high peak. The tack is hooked forward, and the after clew reaches right aft, so that on a wind the whole body of the sail is within the boat.

Toldo Boat of the Douro.—This boat is perfectly flat-bottomed; the sides slope out, and the after end is round and low, but it rises at the bow into a sharp point, wide, however, above, where there is a little deck, on which one of the rowers stands. It is covered with a wooden or canvas awning, supported on stanchions, something after the fashion of a Venetian gondola. The oars used are long with very broad blades. The rowers stand up and push against the oars. One stands aft and steers the boat; sometimes shifting his oar right

aft for steering, and sometimes rowing. One or two men row in the bow; when there are two they cross oars—that is, the man who rows the starboard oar stands on the port side, and the man who rows the port oar on the starboard side. A long, thin, rough pole is used as a mast, on which a spreet-sail is set. The toldo behaves very well under sail. The passengers sit along the sides, as do those in a



TOLDO BOAT OF THE DOURO.

gondola. The roof is flat, and painted green: it is used by all classes. The commoner sort of toldo has merely a white canvas awning stretched over a semicircular frame-work.

THE WINE-BOAT OF THE DOURO is shaped like a toldo, but very much larger; some carry eighty

pipes of wine. The crew row forward, standing up, and pushing against very large oars. At the after part of the boat a high platform is raised, on which the helmsman stands with the captain, and one or two other men. The rudder is a great beam, extending a long way astern, with a wide blade, shorter than that of an oar. It works on a pivot at the end of the stern post, while the inner part rises to the platform. The object of the long oar-like rudder is to steer the boat while she passes down the rapids, which are to be found in the upper parts of the river Douro; the blade is thus beyond the eddy, which would otherwise twist round the boat.

THE AVEIRO CANOE.—Some way to the south of the Douro there is a village called Aveiro, inhabited entirely by fishermen and their families. They are said to be descended from Moors, and this account their appearance, dress, habits, and even dialect, corroborates. They are tall, thin, dark men; they dress in a red cap, a white shirt, and very large white trousers, scarcely reaching to the knee, a blue cloth vest and red sash. Their canoes have a completely eastern look; they are very long and narrow, sharp at both ends, which rise above the water, and are completely covered in, leaving only a small space open in the centre of the boat. They come a considerable distance along the coast in these canoes, and sleep on board them under the

covered part, each end of which looks as if it could scarcely hold more than one person. They catch their fish on the beach,—chiefly sardinhas, a species of herring,—by means of very long seines, or rather several seines joined together, the property of several families of the community.

I had forgotten the farm-produce-carrying boats of the Tagus. Sometimes may be seen what looks like a haystack afloat, but is in reality a boat of hay piled up on a platform on a large boat rigged with a latine sail.

The variety of vessels in the Mediterranean is very great, at the same time they mostly bear a strong resemblance to each other. Latine sails predominate. On the south coast of Spain we find the ZEBEC; she is square-rigged forward, with a steeving bowsprit, a huge jib, and a latine mainsail and mizen.

THE SCAMPAVIA OF THE MEDITERRANEAN is a graceful-looking craft, of a very mixed order of rigging. Her mainmast is square-rigged, while her foremast rakes forward, and carries a large latine sail, with a steeving bowsprit, and a little jib. On her mizen-mast, which rakes aft, she also carries a small latine sail.

THE BOMBARDA is something like a brigantine or a ketch; that is to say, the foremast is square-rigged and the mainmast has a mainsail and gaff topsail; the foremast has, however, no tops or

crosstrees, but is made polacca-fashion, that is, the mast is all in one.

POLACCA BRIG.—This is a very common rig among the Greeks; the masts being all in one, have a peculiarly light and graceful appearance—that is to say, lowermast, topmast, and top-gallant mast; the topsails and top-gallant yards can thus slide down to the lower yards, where the sails are furled, and there is no top weight except that of the masts themselves. The objection to the fashion is, that if a topmast is carried away another one cannot be so rapidly fitted as in the ordinary style; ships, as well as brigs, are rigged in this style.

THE GREEK MYSTICO.—Although many of the Greek vessels are very graceful craft, as much cannot be said for the mystico; she has but one mast, with square sails set on it; it rakes forward, while the bowsprit steeves upwards. The mainsail is set with a spreet, and is very much wider at the head than it is either in height or at the foot, so that it has a peculiarly ungraceful look. The hull is in some respects like that of the catria I have described.

THE FELUCCA OF THE MEDITERRANEAN is generally a long, sharp, gracefully-built boat, with two latine sails and a jib.

THE BALANZA OF SICILY is something of the felucca. Her mizen, however, is small, and not

always latine, being more of the lug cut. She has also a jib set on a steeving bowsprit.

THE SETTEE has two masts pretty close together, with high peaked latine sails. When running, they are set wing-a-wing—that is, one over on each side; and, under these circumstances, a triangular sail is set between the two points, which, when she is bow on, gives her a very peculiar appearance.

The vessels of the Adriatic are peculiar.

THE TRABACOLO is a fore and aft rigged vessel, something like a schooner, but her sails are high narrow lugs. She carries a fore staysail and jib, and square topsail and topgallant sail. Some of the smaller men-of-war of the Austrian government are thus rigged. The fishing-boats seen near Trieste are rigged with two large sails, somewhat of the lug fashion, but with long yards, and have no jib. Other boats are seen in those waters with the foresail latine, the mainsail lug, and on the bowsprit two little square sails, which answer the purpose of a jib.

THE GONDOLA OF VENICE.—No boat has been more often described than the gondola. "Didst ever see a gondola? If not, I will describe it to you." Gondolas are of two sizes. The largest, rowed by two men, are thirty feet in length and five in breadth. They are flat-bottomed and very narrow, but gradually widen towards the gunwale.

They bear in shape a similarity to the war-canoes of the New Zealanders, and some other savage people. They narrow away towards the bow and stern. The bow is ornamented with a high iron beak, such as the galleys of olden days used to carry. This is generally highly polished, so as to shine in the sunbeams. The stern also rises into a point, and is so narrow, that it is lifted completely out of the water by anybody stepping forward. There is a platform at this end, on which one of the rowers stand. The boatmen are called gondoliers. They stand up and impel the gondola by pressing their oars against a long crooked thole, as do the crew of the toldo boats on the Douro. In the centre part of the gondola there is a framework with a circular top, covered entirely with black cloth, ornamented with tufts of the same colour, which gives it somewhat of a funereal appearance. There is a window at each side and a door at the fore end. The passengers sit fore and aft, with their backs to the side. About six people can sit with ease under the awning. The benches are covered with velvet, and the floor is richly carpeted.

The larger gondolas I have described are rowed by two men, the chief-gondolier standing in the bow of the boat. The smaller ones are impelled by one man. Once upon a time the wealthy inhabitants of Venice vied with each other in the

magnificence of their gondolas, spending immense sums upon them; and to so great a height did this fashion run, that many even injured their fortunes by their foolish extravagance. At length the Doge took the matter up, and a sumptuary law was passed, regulating the form and colour, as well as the size of the gondola, and this law remains still in force. Every establishment has its gondola, and people of fashion, instead of ordering their carriages to take a drive, order their gondola, to enjoy a row through the numberless canals which pass through most of the streets of the city, or out on the calm waters of the Adriatic. As there are private carriages and hackney cabs, so are there private gondolas, fitted up with the greatest luxury, and public or hack gondolas, for the use of anybody who may call them. In days gone by the gondoliers delighted in singing as they rowed, keeping time with their oars, both for their own amusement and for the sake of giving notice of their approach to the other gondolas moving in other directions; but a cloud for long hung over fair Venice, and the voice of merriment was silent on her waters. Now however that she is once more free and under her native rulers, it is to be hoped that her gondoliers will sing their songs as of yore.

## CHAPTER XI.

### VESSELS AND BOATS OF AFRICA AND ASIA.

THE numerous large and powerfully armed vessels fitted out by the Barbary States, and which at one time held the merchantmen of Europe in terror, have now disappeared. The Saicque is one of the few craft which remain. She is a vessel with a broad beam, decked over with large hatches, and a low house aft, in which the crew live. She carries two stumpy masts, with large latine sails and no jib, and is generally a fast vessel.

The Riff Pirates possess some large swift pulling row-boats, with which they still attack any small merchantmen drifting near their coasts; but the punishment they have of late years received in consequence of their conduct have taught them the danger of their mode of proceeding.

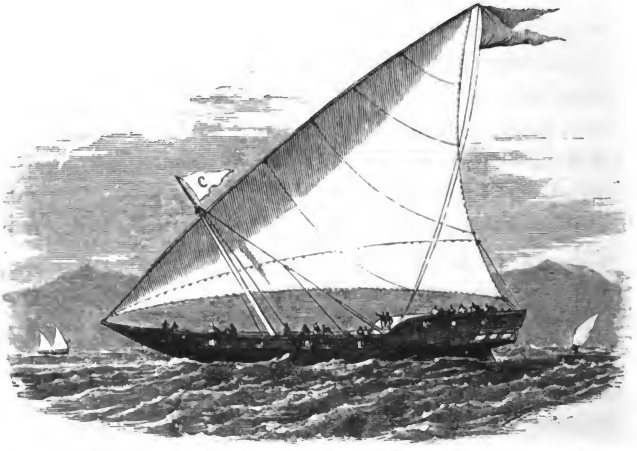
THE CANOE OF THE COAST OF GUINEA is what is commonly called a Dug-out; that is, it is formed of a single tree, which having been cut into the shape of a canoe, the interior is scooped or dug out. It is very long, thirty feet sometimes, but so narrow that there is only just room for one man to

sit in the space between the two sides, though one will carry eight or ten people. They sit on round bits of wood placed at the bottom of the canoe, which is so deep in the water, that it is constantly washing in. Some of the crew are therefore always employed in baling it out. They paddle with very short paddles, and go along at a great rate. There is a heavy surf on the shore, through which they frequently attempt to dash. If they are capsized they do not let go of the canoe, but quickly right her, get in, bale her out, and go on as before. They seem indeed to be amphibious, and as much at home in the water, as out of it.

THE BOAT OF THE NILE.—The boat used by passengers is of large size, capable of holding a considerable number of people. At one end a house is built up, in which the passengers both sleep and live. Few modes of travelling in a hot climate, are more delightful, for although the scenery on the banks of the far-famed river may be monotonous, the interesting ruins to be visited during the voyage, make ample amends for all inconveniences which have to be undergone.

We now come to Asia. Along the shores of that wonderful quarter of the Globe there exists a very great variety of boats and vessels. No people in the world surpass the natives of our Indian possessions in the art of ship-building, especially in the way in which they join the

planking of their vessels so as most effectually to keep out the water, without any additional caulking. Where the planks join, there is, I believe, at the time put in a very slight amount of cotton, to fill up any unevenness in the wood.



THE ARAB DOW.

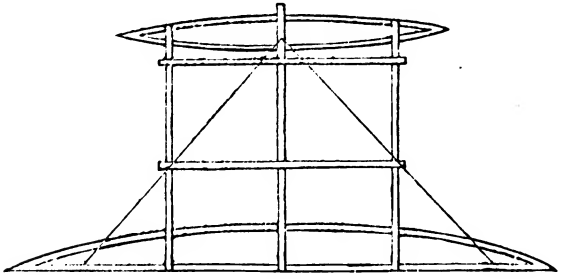
Several fine line of battle ships have been built in India of teak, and they have been in every respect found to be equal to those constructed by our own shipwrights at home. Both the naval architect and the builders have been natives. Having gone round the African coast without meeting with many craft to afford us much in-

terest, we will cross the Straits of Bab-el-Mandel, when we shall find ourselves off the coast of Arabia. Among all the craft which navigate the Indian seas the most commonly met with is

THE ARAB DOW.—She is a vessel of from sixty to eighty tons, often more, and yet for the most part completely open. Her hull is of an odd shape, and has a most unseaworthy look. The bow, especially, rises high out of the water, gradually narrowing and projecting a long way beyond the hull, till it becomes a mere point. The stern is raised considerably, is broad, and much higher than the bow. A house or raised poop is built up here, within which the captain and passengers or crew live. There is often much paint and carving outside, indeed the stern bears some similarity to that of our old-fashioned European vessels. Compared to the size of the craft, it is large and heavy, and makes the shape of the long pointed bow look still more incongruous. She carries one large latine sail, extending completely fore and aft, the tack being hooked on to the bow, the mast rakes forward, and is set up with a runner and tackle. They have of late been found employed in carrying off slaves from the east coast of Africa, to supply the larger slave vessels, who meet them at a small island to the north of Madagascar.

THE BOAT OF THE INDIAN SEAS.—The great

principle of this strange craft is the outrigger, which projects a long way out on the weather side, with a small canoe attached to it; the lee side is perfectly flat, but the weather side is rounded to throw off the seas; the stem and stern are exactly alike, so that the boat is never put about, the sail alone being shifted. The object of the outrigger is to balance the boat, which would otherwise instantly go over on the flat or lee side. The lee side being flat, no resistance whatever is offered to the water. When necessary, the crew can run out to the end of the outrigger, and thus increase the weight on the weather side. The following diagram will serve to explain the principle of these curious craft.



OUTRIGGER CANOE.

These craft are of different sizes, and are rigged in a great variety of ways. One of the largest is a decked vessel, with one mast, on which, in

a very ingenious way, two square sails are set. The mast is stepped in the middle of the vessel, and on that a large square sail is set, with a shifting bowsprit and jib set on it. There is a long swinging boom stayed up at an angle of 45° to the mast, so that the end hangs out towards the stern; to the end of this another smaller square sail is hoisted, and the sheet brought right aft; thus the jib and bowsprit and this boom and square sail are very easily made to change places.

THE CANOE OF TRINCOMALEE is a dug-out, and carries three or four people; the sail is set between two bamboos, which fork upwards from the centre.

THE CEYLON DOW.—This craft is very unlike the Arab Dow in build, having a much more seaworthy appearance; she is in shape not altogether unlike a Dutch *Dogger*; indeed, in consequence of the Dutch having been long masters of the principal parts of the island, it is very probable that she was formed after the models of the smaller vessels which came from Holland. Sir Emmerson Tennant, in his admirable work on Ceylon, describes another craft used by the Singhalese. After mentioning the dows, the dhoneys, and the patamars of the coast of India, he says, "But the most remarkable of all are the double canoes of the Singhalese, which dart with surprising velocity among the shipping, managed by half-clad natives, who offer for sale beautiful but unfamiliar

fruits and fishes of extraordinary colours and fantastic forms. These canoes are dissimilar in build; some consisting of two trees lashed together, but the most common, and by far the most graceful, are hollowed out of a single stem from eighteen to thirty feet long, and about two feet in depth, exclusive of the wash board, which adds about a foot to the height. This is sewed to the gunwale by coil yarn, so that no iron or any other metal enters into the construction of a canoe. But their characteristic peculiarity is the balance-log, of very buoyant wood, upwards of twenty feet in length, carried at the extremity of two elastic outriggers, each eighteen feet long. By these arrangements not only is the boat steadied, but mast, yard, and sail are bound securely together. The outrigger must, of necessity, be always kept to windward; and, as it would not be possible to remove it from side to side, the canoe is so constructed as to proceed with either end foremost, thus elucidating an observation made by Pliny eighteen hundred years ago, that the ships which navigated the seas to the west of Taprobane *had prows at either end,* to avoid the necessity of tacking. These peculiar craft venture twenty miles to sea in the strongest wind, and they sail upwards of ten miles an hour. It is remarkable that this form of canoe is found only where the Malays have extended themselves throughout

Polynesia and the coral islands of the Pacific; and it seems so peculiar to that race, that it is to be traced in Madagascar and the Comoros, where a Malayan colony was settled at some remote period of antiquity. The outrigger is unknown amongst the Arabs, and is little seen on the coast of India.

THE PATTAMAR OR PATTAMACH OF THE MALABAR COAST is not unlike an Arab dow in build; she has the same long bow and high stern, with a curving sheer; she has a counter, but not very deep, and a high taffrail; she carries a large latine mainsail, and a small mizen; these sails have a high peak, and are between the latine and lug in shape.

THE CATAMARAN, OR SURF-BOAT OF MADRAS.—There is no harbour at Madras, so that ships have to remain at anchor in the open roadstead. Persons going on shore have therefore to land on the open beach. Often, however, a heavy surf sets on the shore, through which no ordinary boat could pass with safety; the natives have, in consequence, invented a sort of raft, called a Catamaran, seated on which, and perfectly naked, they will force their way in the most blowing weather out to sea, and carry messages to the ships in the offing. They wear high conical caps, secured by the folds of their turbans, and into this cap they put any letters intrusted to them. The catamaran consists of three

logs, pointed at the bows, and slightly narrowing at the stern. They are fastened together by two cross-bars; the rower sits on the after one, and presses his feet against the one forward, which is exactly at the part where the three points separate. He uses a longish paddle. Being an excellent swimmer, if washed off he speedily regains his raft, and rarely or never are any of them lost.

THE MASSULAH BOAT OF MADRAS.—This boat is a widish dug-out canoe, very destitute of grace or elegance. It is, however, from its form, well adapted for passing through the surf on the Madras coast in moderate weather. The crew, who sing as they paddle, are very nearly naked. Passengers from the ships generally land in these boats.

DOUBLE CANOE OF MADRAS.—For crossing rivers in the Madras Presidency a double canoe is used. It is formed of two logs of the Palmyra palm, which is excessively light. The trunks are dug out; the bow being rounded, and gradually narrowing towards the stern. They are placed about six feet apart, and connected by a bar at the head. When a palanquin has to be conveyed over a river, it is placed across the two canoes towards the after part.

THE INDIAN BUDGEROW AND DINGEY.—The Indian rivers are crowded with craft of all sizes, but they do not differ very much in shape. The budgerow is employed by travellers proceeding up or down

the rivers. It is a somewhat shapeless and ungraceful mass. The stem and stern rise high out of the water, and are extremely bluff. They are flat-bottomed, and thus draw very little water. In the after part a cabin or house is formed with bamboos; the roof and sides being closed in with strong jungle grass. It is from thirteen to fourteen feet long to eight or nine wide. There is another cabin for servants forward. The head and stern are generally much carved and painted. They carry one large sail, which is set to stem the current when the wind is favourable. If there is no wind, or it is against them, the crew track the boat along shore. Two oars are used, each rowed by two men. The pilot or helmsman stands on a platform aft, whence he can command a view of everything around. They frequently at their mastheads carry little bells, which, tinkling as they progress, serve to give notice when two boats are approaching each other. They also carry a white flag. No anchors are employed; the boat, when they bring up, being always made fast to the bank of the river by means of a short stout pole, which is stuck into it, and to which the painter is secured. The rudder is triangular, and of great size. There is but one mast, on which three very thin though large sails are set. They very soon, from their fragile texture, get into holes; but they must be in a very tattered condition indeed before they are considered too bad to use; indeed,

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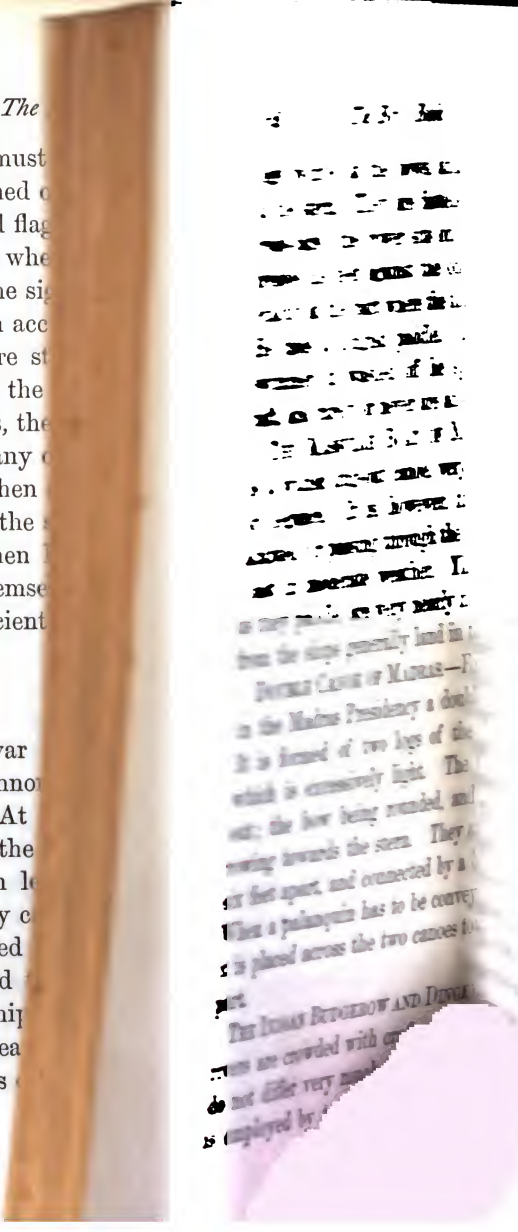
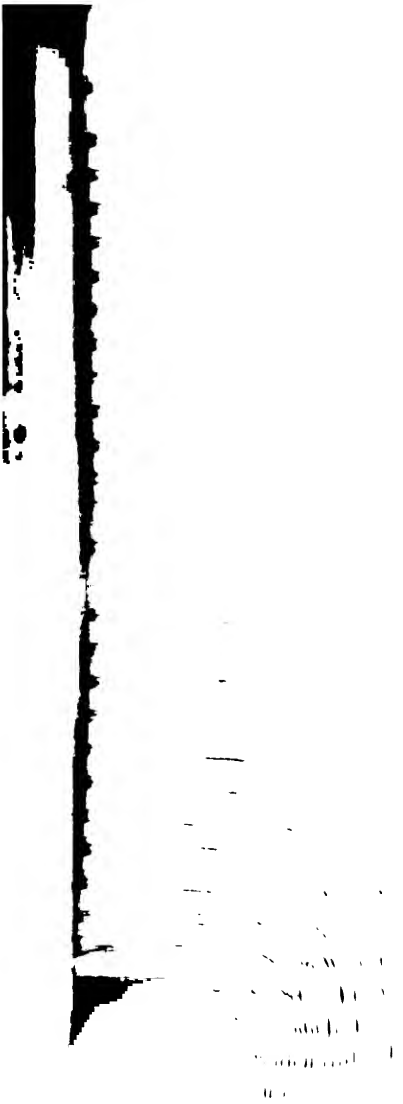




sudden squalls are of constant occurrence, and the sails being thus easily blown away prevents the boat from being upset. A small boat, called a dingay, fitted up as a kitchen, is towed astern of the lofty budgerow. Another boat, with the luggage of the passengers, also accompanies her; indeed, in India, there are almost as many people required to be in attendance on a party travelling by water as by land. When the wind is contrary, the boat is tracked or towed along against the stream by the crew. A tow-rope is made fast to the masthead, and the crew, attaching themselves to it, work away from sunrise to sunset, frequently having to wade through nullahs or creeks up to their middles in mud and water, On all the rivers of India boats are found little more than canoes, hollowed out and decked over with bamboo, and partly covered in with mats. One man steers and two others paddle. When they wish to sail, they take off the scarfs they wear over their shoulders, and setting them on some slender bamboos, a sail is procured of sufficient size to drive on their light barks. With so much skill do they manage their frail canoes, that an accident rarely occurs.

BURMESE WAR BOAT FROM RANGOON.—This magnificent canoe is formed out of a single giant teak-tree. The trunk is first shaped into the desired form, and it is then hollowed out with fire. When this operation is completed, a wash-strake, about a

foot high, is secured round the gunwale. The stem and stern both gradually narrow, but the stern curves up several feet above the water, and is richly ornamented with carved work and gilding. The bow rises but slightly. On it is mounted a gun, sometimes an eight or nine pounder. The larger boats are propelled by oars, worked by as many as a hundred men, who sit two and two, or double-banked. Paddles are used in the smaller boats, which carry crews of only twenty men. They pull very fast, and no European boat can come up with them.

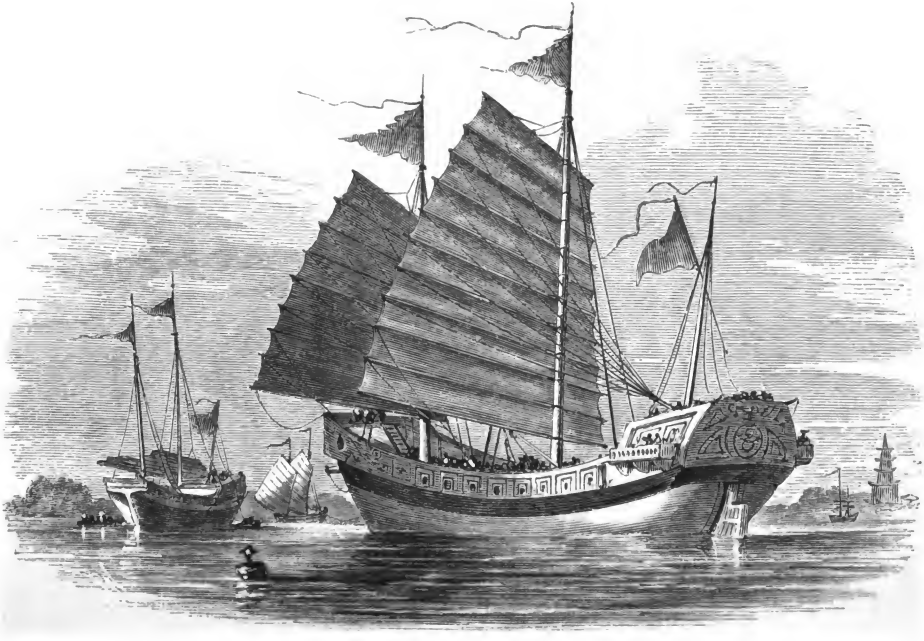
We shall now have reached a land, whose people claim the patriarch Noah as their first emperor, and who, undoubtedly having once attained a considerable amount of civilisation, have since made the slowest advance of any nation in the world.

Probably but little alteration has taken place in their junks for many hundred years, except, perhaps, that as they found population and commerce increasing, they have enlarged the size of their merchant junks, that they may carry the greater amount of cargo required. There are a great variety of craft in China, from the handsome junk of eight hundred tons to the insignificant-looking sampan. The sails of all Chinese vessels are made of a matting of brownish-yellow colour. They are set on a yard, and parallel with the yard, entirely down the sail, are strips of bamboo, which serve to

strengthen the sail when set, and to reef it easily when it is lowered, as it is somewhat in the fashion of a Venetian blind. Their boats are all of varnished wood. The men-of-war and mandarin boats are generally painted black with red railings; at times, however, their hulls and topsides are white or green. The size varies according to the mode in which they are employed. They have all a very strange, rough, and barbarous look. The larger rise to a great height out of the water, especially at the poop, where there are two or more decks above the main deck, with much carving and painting—the cabins often being richly furnished according to Chinese notions. The sides are not rounded, but flat, sloping in gradually to the floor or bottom, which is also flat. The stern is flat, but extends beyond the stern-post. A deep groove or recess is made in it, reaching to the stern-post, and in this groove the rudder is hung. The groove is made that the rudder may be protected from the force of the seas. The rudder itself is very broad in shape, something like that of a Thames barge. A great part of the rudder-head is exposed to view; but in some vessels, which have an overhanging counter, it is partly hid by it.

I will now give a slight sketch of some of the various sorts of craft to be found on the rivers or off the coast of China:

1st. There is the large CHOP, OR CARGO BOAT.—



CHINESE JUNK.

She is flat-bottomed generally, and draws from six to eight feet of water. The lower part of her hull is painted entirely black. A rail, about two feet wide, extends entirely round her side, above the gunwale. On this her crew walk backwards and forwards; and in calm weather, in shallow water, shove her onwards with long poles. There are many varieties of this style of boat, but all go by the same name of "chop-boat." They vary in size—generally from two hundred to three hundred tons; but some are much smaller. The entire of the vessel is covered in, fore and aft, with slight bamboo work, over which is spread a strong elastic sort of matting, formed of the long leaves of the Palmyra palm. This covering is easily removed when the cargo is to be discharged. They have but one mast, on which a large square sail of matting is set. It is extraordinary how easy they work under this single sail. They stay very rapidly, and never lose way. In light winds or calms, they are propelled by two sculls aft, and oars worked in the fore parts of the vessel, or by poles shoved along against the ground.

2nd. A GENTLEMAN'S PLEASURE OR TRAVELLING BOAT.—We most of us may remember to have seen gingerbread coaches at fairs. The boat used for the conveyance of officials, or gentlemen of consideration, is of this description. The solid part of the stern is raised several feet above the water, and the after part of the vessel is covered in with

a framework of bamboo and matting; and all the wood work is highly varnished. All the part before this, occupying more than half the boat, is covered in with a flat roof, while the sides are fitted with windows of lattice-work and glass. Sometimes, instead of glass, talc, or the interior lamina of the oyster-shell, is used. In some, gauze, or transparent coloured oil-paper is employed, to keep out the air. Generally, birds, flowers, and other curious devices, in the Chinese fashion, are painted on these blinds. All the bulkheads, or the divisions which form the cabins, are ornamented in the same way. Square traps lift up in the floors of the cabins, in order that the luggage may be lowered down into the hold.

There is a great deal of carving about the boat, and it is generally painted of a bright green picked out with vermilion. The roof of this pavilion forms a sort of deck, on which there is a little joss-house or temple. The crew, who sometimes have their families with them, live in the after part—here also is the kitchen. There are two flag-staffs aft, on one of which is hoisted the official flag of the occupant—on the other is merely a vane to show how the wind blows. This boat carries one sail like the chop-boat, but smaller; she is propelled exactly in the same way. The cooking in these boats, as also in the chop-boats, and most other Chinese crafts, is carried on in the after part. In

these boats great distances are traversed along the rivers and canals of China; and as they are fitted up with every attention to luxury and convenience, according to Chinese notions, they must afford a very pleasant means of travelling through the country.

3rd. THE DWELLING BOAT.—A large proportion of the population of China live on the water; even many people who gain their livelihood on shore have their habitations afloat. The boats they live in are of different sizes; they are covered over fore and aft with palm-leaf matting and bamboo. The covering can be slid off in the day, and drawn over again at night: whole families live in these boats. When employment cannot be found in one place they move on to another; at night they make fast to stakes in the mud, one alongside the other, and thus form large tiers, which have the appearance of an island on the river. These boats also go by the name of the egg-house boats, from their peculiar shape, which is not unlike the longitudinal section of an egg. Many of them, in which a whole family will stow themselves away, are very small, not being more than fourteen feet long and about six broad; this covering is not unlike that of the tilt of a wagon. These people are looked on as a distinct race of the population; they are under different regulations to those living on shore, with whom they are not even allowed to inter-

marry. The females of the family usually manage these boats; indeed, boats in China are constantly navigated by women. They seem to be a very contented happy part of the population, and quarrels or disputes of any sort rarely take place among them.

4th. THE MANDARIN BOAT.—This is a very different looking craft to those I have described, but still is thoroughly Chinese from one end to the other; she pulls sometimes twenty oars of a side, and there is a round shield with a hideous face painted on it, hung over the side, near each man's arm. Besides the men pulling, they have a numerous crew, with a large supply of pikes, gingals, and other weapons; they also carry swivel-guns. They are painted green and red, and sometimes the lower part of the sides are white. They are long and low in the water, adapted for pulling, and besides this they have three masts, on which large sails are set, surmounted with coloured flags; the after part, as well as the entire railing of these boats, is formed of bamboo.

5th. THE COMMON SAMPAN.—This is a roughly-built broad boat, generally used to get up the junks' anchors, or to do other work for vessels; they are propelled by a scull and a pair of oars, and as they draw very little water they are made to skim along over the surface at a great rate—large chops and junks employ them just as European ships do their boats.

6th. THE EEL BOAT.—This is a mere canoe or punt; the greater part is covered over with a low arched roof, which does not reach quite to the edge. It is painted of a light sky blue; one man sits aft with a pole or paddle and shoves it along among the reeds or against the banks of the river; when the sky is clear and the sun is shining, the eels, which have got up on the banks, mistaking the blue covering for water, leap on to it and slide down into the bottom of the boat.

DUCK BOAT.—Among the aquatic population of China, the duck-keeper and his boat must not be forgotten. He and his wife and children live on board from one end of the year to the other, under a raised deck in the after part of his vessel, while his feathered charges occupy the hold. He moves from place to place, where food is to be found in greatest abundance for his ducks. The rice-fields, after the rice has been gathered in, afford the most abundant feeding for his charges. The boat is fitted with a sort of bridge at the side, which is let down, much as is the fashion in horse ferry boats, to allow the cattle to walk on shore. Over this bridge, or platform, at a given signal, the ducks all waddle on shore, one after the other, in proper order, and set to work to pick up all the grain they can find. Once upon a time, it was the most abominable custom of some Tartar captains of men-of-war to flog the last man in off

the yard, when reefing topsails, in order to teach the crew to be smart about the work. I do not know whether those enlightened captains had heard of the custom I am about to describe of the Chinese duck-keepers, or whether the duck-keepers took the notion from them. In order to make the ducks hurry on board the instant the signal of recall is given, their keepers—more kind, however, than the captains—give the first duck who arrives an additional supply of food, and they whip the last one for his dilatoriness. It is very amusing to see the birds flying and scuttling over each other's backs, in order to be on board in time, and to avoid the punishment to be expected. The poor seamen used to do the same, but it was a much more serious matter; and many a gallant fellow lost his life by falling from aloft, in his endeavour to be in before his shipmates. Such an accident was the cause of one of the most terrible mutinies which ever took place on board a British man-of-war, the crew having risen, and murdered nearly all their officers. Happily, such an event is now rendered impossible, as, although the due authority of the captain is as great as ever for all good ends, the power of tyrannizing over his men is completely taken out of his hands. To return to the Chinese ducks. I am not quite certain whether the hope of reward or the fear of punishment induces them to make the greatest

speed; but I am very much inclined to believe that the hope of receiving a dish of paddy has the greatest influence over their minds.

THE JUNK.—The junks, intended either for war or commerce, differ but little in shape or mode of construction. Some are of very great size, measuring nearly a thousand tons. They are built of an extremely light wood, so that they draw very little water. The bottoms are flat, and so are the sides, which extend gradually outward, to give them the required beam. The stern is flat, and the bows are completely blunt, without any stem, nor do they even carry a bowsprit. The sterns and forecastles rise in a succession of decks, gradually decreasing in size as they near the top; the upper one being very small, and only allowing a few people to stand on it, or, indeed, sometimes being merely a roof. On either side of the bows of all Chinese vessels are painted huge eyes, for the purpose, as the Chinaman observes, of seeing their way. Frequently also, the heads of dragons and other monsters are painted or carved on them, to answer the purpose of our figure-heads. The anchors are huge, clumsy-looking, contrivances of hard wood, the flukes being tipped or plated with iron. Chunam, or lime putty, is used instead of pitch for caulking, and bamboo shavings answer the purpose of oakum. On the deck is the joss-house or temple, before

which incense, sticks, and gilt paper are constantly burnt as offerings. When there is a calm, and a breeze is wished for, instead of whistling, the seamen form junks out of gilt paper, and set them adrift on the water, in order to propitiate their divinity the "Goddess of Heaven," who is supposed especially to watch over seamen. A curious contrivance is sometimes employed outside the bows to serve the purpose of a windlass for getting up the anchor.

When it is necessary to reef or lower the sails, the seamen climb up by the laths placed across them, and then stand on the upper part of the yards to tread them down—down-hauls not being in use. They employ bowlines, however, to stretch them out.

The rudder of a junk is hung by ropes or hawsers, and can very easily be lifted out of its place, and slung alongside. The timber of which junks are built is called Saaomock. The captain and officers maintain very little authority over the crew, and there is a constant noise and disturbance going forward. Altogether one of the largest Chinese junks is the most curious floating object of human contrivance to be seen in the world of waters, and about as much unlike a first-rate British man-of-war as it is well possible to conceive.

All vessels and boats employed for a like

purpose in China have the same characteristics; and thus, in order to distinguish one from the other, they have a slight variation in paint, or a black patch of a peculiar shape on the sails, so that it may be known at once where the craft is from.

The law compels the boats on the rivers to adopt a similar practice, in order that the revenue officers may know in what occupations they are employed. The clothes worn by Chinamen in summer are generally made of blue or brown nankeen, or cotton cloth; and in wet or cold weather they put over them jackets of a rough woollen cloth, or cloaks of matting.

In describing the mode of propelling boats, I ought to have explained that the sculls spoken of are short, thick-bladed paddles, hanging down close to the side of the vessel. They are not lifted out of the water, but by the peculiar movement which is called sculling—that is, twisting the paddle backwards and forwards, so that the blade is constantly pressed against the water—the craft is urged onward. This is the principle of the screw propeller invented by Mr. F. P. Smith, only instead of being worked at the side, it is placed in the stern of the vessel. In narrow creeks, or among crowds of vessels, this mode of sculling on a boat is very useful.

VESSELS OF JAPAN.—Japanese vessels are built

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of either fir or cedar, both of which woods grow in abundance on their islands. The merchant junks vary according to the purpose for which they are intended. The pleasure boats are numerous, and of different sizes. They are generally impelled by oars. The larger pleasure boats have two decks. The cabins in the lowest are low, but above them is another, lofty, of large size, and handsomely ornamented, like those of the Chinese. It has open windows, and can be divided into separate compartments by means of screens and bulkheads.

The merchant vessels are generally one hundred and twenty feet in length, and twenty in breadth. They are fitted with sails as well as with oars. They taper to a point from the midship board to the bow, and the two ends of the keel rise considerably out of the water. The body of the vessel is not convex, as in all European vessels, but the part which is below the water mark runs almost in a straight line towards the keel. The stern is broad and flat. A very curious peculiarity of it is that it has a large hole or port in the centre, quite low down, through which the whole interior of the vessel may be seen. This port was originally a rude contrivance either for working the rudder, or for unshipping it and bringing it on board, but the government now compel all vessels above a certain size to have it, that they may be

thus less sea-worthy, and that their crews may not be tempted to go to a distance from the tombs of their ancestors, and introduce among them the manners and customs of the surrounding barbarous nations of the world. The deck of the junk rises towards the stern, and is widest along the sides. It is formed of loose planks of fir which are not fixed or fastened together, and, when she is fully laden, are but little above the surface of the water. A cabin or rather upper deck covers the whole vessel, a small space only being left open at her stern, for the stowage of anchors, cables, &c. This house projects nearly two feet beyond each side of the vessel, and the sides are full of windows, which are glazed, and can be opened at pleasure. It is divided into separate cabins by screens, and ornamented like those of the Chinese. The upper deck is flat, and formed of planks well joined together. These vessels carry but one mast, which can be lowered by a tackle much in the fashion of a Thames barge. It lowers down on a rest on this upper deck, and over it at night the sails being spread, with an additional covering of straw, a shelter is formed, under which the seamen sleep. The anchors are of iron, and the cables of a sort of straw, twisted so that it is of very considerable strength. These junks carry only one sail, which is made of canvas, and is of great size. When it is calm, thirty or forty oars are used. The rowers

sit on benches, placed in the after part of the vessel. They row in time, to a tune sung by the whole crew. They sit high above the water, and lift the oars up and down without any sweep forward. The oars are curved, and have a flexible joint in the centre, which enables them to be lifted quickly out of the water. Copper bolts and bands are used in building the vessel. The bow is ornamented with a tassel of long black strings; and, when persons of rank are on board, their cabins are ornamented with hangings, on which their arms are embroidered. As soon as the anchor is let go, or the vessel is moored, in those of smaller size, the rudder is unshipped, and made to serve as a bridge, by which the passengers and crew may pass through the after part to the shore. Sir George Staunton describes the beautiful effect produced at night by the crews of hundreds of vessels singing as they row on the waters of China. He says that some vessels have their two sculls forward and some aft, and that some have one forward on one side, and one aft on the other. Several men are employed to move each of them. They are never taken out of the water, but are made to perform, beneath its surface, a kind of vibratory motion, displacing the water first with one edge, and afterwards with the other. This labour the men seem to undergo with pleasure, keeping time with their strokes to a spirited air,

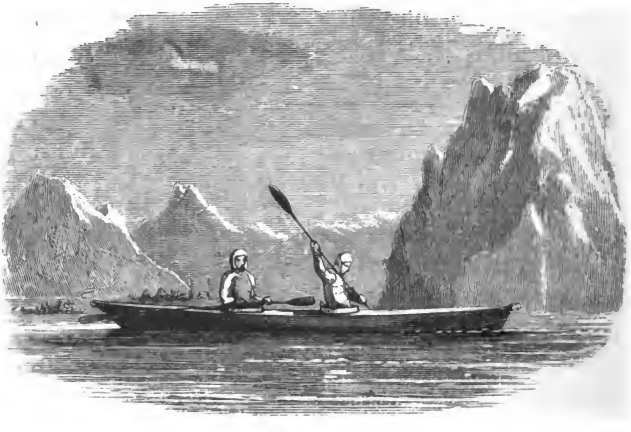
sung by the master, and accompanied in the chorus by all the men.

I have seen two paddles, very like those described—worked by steam, however—one on each quarter, of canal boats in Canada. The poor fellows towing the track-boats in China are, however, subject to a very different discipline. Wading, swimming, leaping along the banks of the rivers and canals, hour after hour, in the hot burning sun, they are urged on to their work by a police-officer, or soldier, with whip in hand. If they faint and stop, he beats them up: often they sink and die. The most scanty pay, or no pay at all, is their sole reward at the end of the day. The next day, another set of trackers is impressed for the service; nor dare the miserable peasants refuse to obey the stern command. With this slight sketch, which may serve as an example of the mode in which Chinese peasants are ruled by their paternal government, I will conclude this account of the ships and boats of Asia.

## CHAPTER XII.

### VESSELS AND BOATS OF AMERICA AND THE PACIFIC.

In my description of the boats of America, I will begin with an account of those found in the most northern part of the continent. Had the



ESQUIMAUX CANOE.

Esquimaux wandered the world round, he could not have found a boat better suited to his mode

of life than the one he has contrived for himself. He requires a boat with great buoyancy and strength when afloat, and at the same time so light that he may carry it on his shoulders, or drag it up over the ice, or away from the influence of the waves, while, should he be upset, he can again right it without much difficulty. The materials he uses are whale-bone and seal-skins. The whale-bone is not employed instead of ribs; but he takes the longest pieces he can find and joins the ends together at the stem and stern by sewing them with strong sinews, and bowing them out at the broadest part to form the hull. These canoes are from ten to twenty feet long, and about two broad; in shape like a weaver's shuttle; sharp at both ends, so that they can be paddled either way. In the centre part stouter bits of whale-bone are put on to keep the canoe of the required width. Over the whole of this framework seal-skins are stretched, and neatly sewn both over the upper part as well as the lower, leaving only one opening in the centre, sufficiently large to admit a man's body. The canoe thus formed is flat-bottomed, sharp at both ends, and decked over, with the exception of the above-mentioned hatch-way. In this hole the Esquimaux sits, with his feet stretched out forward, completely filling up the space with his seal-skin coat; indeed, in some instances, a seal-skin bag, as it were, is sewn

round the hole, and when he is seated in it, the upper part is fastened round his waist, so that he can neither tumble out, nor can any water by any possibility get in. His dress is tightly fastened also at the wrists and round his neck, so that the sea and spray break over him without injuring him, and though apparently overwhelmed, he rapidly again rises to the top of the waves. His paddle consists of a pole six feet long, with a blade six inches broad at each end. This serves him to balance his canoe, as at the same time he strikes the water alternately right and left with it. It is said that with such rapidity can he urge on his light canoe, that without difficulty he can distance an eight or ten-oared boat. Such admirable sea-boats are these canoes that they can go out in the roughest weather, and vie with the wild sea-fowl in breasting the billows of the ocean. Similar canoes are used by the inhabitants of the Fox or Schumagen Islands. A few years ago I was shown, at the museum of the Aberdeen University, a canoe of the exact character of the one I have described. It contained, when discovered off the coast, one occupant, who was still alive, but in the last stage of exhaustion, and scarcely had he cast his dim eyes on the white man who came to his rescue, than he breathed his last. I thought, as I examined the ingenious and curious contrivance, of the long and solitary

voyage that poor Esquimaux must have performed, driven off probably by some gale from his native shores; and how much he must have suffered as he drifted away before it, for the long distance he had come.

The BIRCH-BARK CANOE.—The canoe of the North American Indians is made of the bark of

BIRCH CANOE AND PADDLES.

the white birch, the framework being of cedar splints, which are exceedingly thin and tough. I made an excursion in one of these canoes on Lake Huron, during a visit I paid to Canada some years ago. While crossing the lake in a steamer we put in for shelter, during a heavy gale, under the lee

of an island, on which we found encamped a large body of Indians. Hearing of the ruins of an old Jesuit fort some way along the shore, we engaged some of the Indians to carry us to it. Several canoes, each from fourteen to eighteen feet in length, were drawn up on the beach. They were about three feet wide, pointed at both ends, where they curled up, and turned somewhat inward. The bottoms and sides were rounded and curled in, so as to make the boat narrower at the gunwale than it was a little lower down. The canoe was kept from falling inward by narrow strips of the cedar placed at intervals across it. The ribs were made of broad thin strips of cedar, while narrower pieces ran fore and aft, the whole sewed with the greatest neatness together. The bark is peeled off the birch trees in such large sheets that very few of them serve to cover a canoe; where they join they are neatly sewed together. The seams are then covered over with either tamarask gum or with the pitch of the yellow pine. As soon as the Indians understood what we wanted, they lighted some torches, and turning the canoes upside down, held them over them for the purpose of melting the tamarask gum, that it might run down the seams. Having ascertained that the canoes were in a sea-worthy condition, two Indians gently lifted them into the water, when they were brought alongside our boat. Great as is the

weight their canoes are capable of carrying, it is necessary to step very carefully into the exact centre, to avoid a capsize. One of our companions tumbled in, and very nearly rolled out on the other side, as I have seen a man do when he has first attempted to get into a hammock on board ship. Escaping such a catastrophe, my wife and I, and two other gentlemen, embarked in our canoe; two Indians sitting on thwarts, level with the gunwale, paddled in the bows, while a third sat in the stern to steer the canoe. We were thus seven people in all, embarked in this frail, papery-looking bark. A low box was placed for my wife to sit on, but we gentlemen had to squat down in a posture neither graceful nor comfortable. Away we went right merrily, cutting rapidly through the bright blue waters, along the tree-fringed shore, our jovial crew singing, laughing, and talking to each other, delighted, doubtless, with the unexpected harvest of wealth they were about to reap.

We proceeded on our voyage to the extreme borders of Canada and the most northern point of the United States, to a place called the South St. Marie. Here we remained some days, and I had frequent opportunities of paddling in canoes.

The river which here rushes out of Lake Superior forms some strong rapids, which, however, the canoes of the Indians are perfectly able

to surmount. It was curious to see them out catching white fish in the evening, with what is called a scoop net. Two men go in each canoe, one sits aft to paddle and steer, the other stands in the bow furnished with a long pole and a net, something like a landing net, three and a half feet in circumference and six feet deep. He knows exactly the holes under the rocks where the fish are wont to lie, and so urging his light canoe up the rapid with his long pole, as soon as he reaches the desired spot he lays it down, and seizing his net, with a rapid whirl over his head, he scoops out the hole, as it were, and seldom fails to bring a fish to the surface. The Indians also spear the fish in the usual way on the rapids.

I will now give a description of the Hudson Bay Company's largest canoes, from a work on Canada, by Mr. Schoolcraft. "They are thirty-five feet in length, and six in width at the widest part, tapering gradually towards the bow and stern, which are brought to a wedge-like point and turned over from the extremities towards the centre, so as to resemble in some degree the head of a violin. They are constructed of the bark of the white birch-tree (*betula papyracea*), which is peeled from the tree in large sheets, and bent over a slender frame of cedar ribs confined by gunwales, which are kept apart by slender bars of the same wood. Around these the bark is sewed, by the slender

and flexible roots of the young spruce-tree, called *wattap*, and also where the pieces of bark join, so that the gunwales resemble the rim of an Indian basket. The joinings are afterwards luted and rendered water-tight by a coat of fine pitch, which after it has been thickened by boiling, is used under the name of gum. In the third cross bar from the bow, an aperture is cut for a mast, so that a sail can be employed when the wind proves favourable. Seats for those who paddle are made by suspending a strip of board with cords from the gunwales, in such a manner that they do not press against the sides of the canoes. The Fur Company's people have introduced the use of oars, but the natives still employ the paddle, with a light and slender blade. In either case they are steered with a larger paddle, having a long handle and a broad blade. A canoe of this size, when employed in the fur trade, is calculated to carry sixty packages of skins, weighing ninety pounds each, and provisions to the amount of one thousand pounds. This is exclusive of the weight of eight men, each of whom are allowed to put on board a bag or knapsack of the weight of forty pounds. In addition to this, every canoe has a quantity of bark, wattap, gum, a pan for heating the gum, an oven, and some smaller articles necessary for repairs. The aggregate weight of all this may be estimated at about four tons.

Such a canoe thus loaded is paddled by eight men, at the rate of four miles per hour in a perfect calm; is carried across portages by four men; is easily repaired at any time and at any place, and is altogether one of the most eligible modes of conveyance that can be employed on the lakes, while in the interior of the north-west—for river navigation, where there are many rapids and portages—nothing that has been contrived to float upon water offers an adequate substitute. Every night the canoe is unloaded, and, with the baggage, carried ashore; and if during the day a storm should arise, such is the activity of the Canadian *voyageurs*, that ten minutes' times is sufficient to effect a landing and secure both vessel and cargo.

THE DUG-OUT.—On some of the rivers and lakes of Canada, canoes are used, formed of trunks of trees hollowed out. Many of them are very light, and well formed. They are only used when it is not necessary to transport them across portages, as—though, of course, more durable and far stronger than the birch-bark canoe—they are not nearly so light and easily carried.

THE ICE-BOAT.—During the winter in Canada, when the smaller lakes, and inlets of the larger ones, are frozen over, ice-boats are employed, which sail over the ice at very great speed. A long narrow boat is placed on a sort of cradle,

which has three large skates fixed to it—one forward and two aft—forming an acute-angled triangle. Fore and aft ordinary boat sails are set. The rudder is a long oar, fixed securely to the stern of the boat, on a pivot; and the blade is of iron, which can dig deeply into the ice, and thus, as is obvious, easily turns the boat. These boats sail at a great speed, and keep very close to the wind. They can also easily go about.

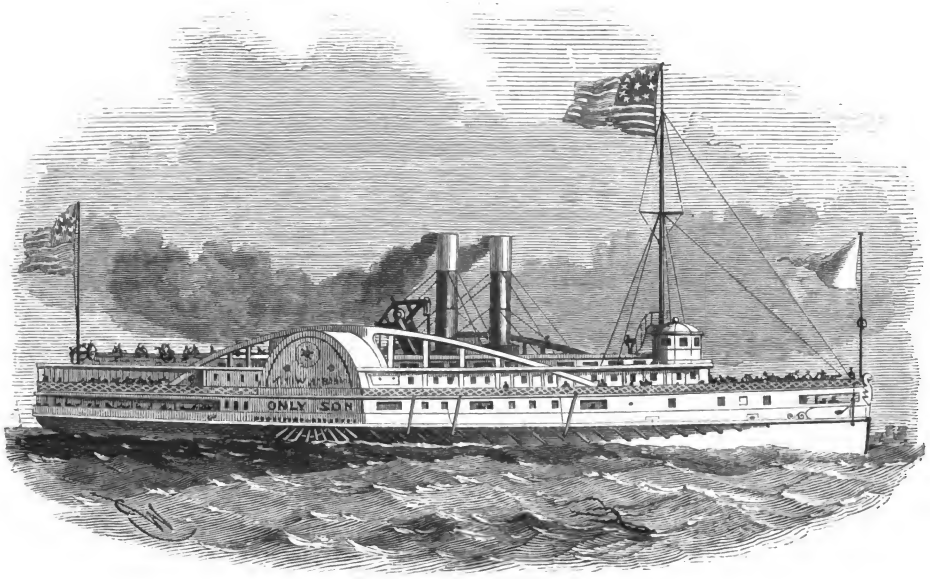
CANADIAN TIMBER RAFTS.—Huge rafts, formed of logs of timber roughly squared, are frequently seen descending the Ottawa and St. Lawrence rivers. The logs are securely lashed together, and often cover from a quarter to nearly half an acre of space. Wigwams, or huts, are built on them, to serve as the habitation of the crew; and numerous masts are stepped, on which square sails are hoisted when the wind is fair. They drop down, however, with the current, their course being guided by men, with oars, working at the sides, or, in shallow water, poling them along. Large parties of men go up in the autumn, or "fall," as the Canadians say, and fix themselves near the banks of some of the long streams which feed the Ottawa and St. Lawrence, several hundred miles above their mouths. Here they cut down trees and square them out; and when the rivers are frozen, and the snow covers the ground, they drag the logs over the snow, and leave them on

the ice. When the ice melts, the logs are thus, without difficulty, afloat. They are now lashed together; and each raft, under the guidance of a couple of *voyageurs*, floats down the stream till the width allows of more being joined together. In this way, they advance till they arrive at the rapids, or falls, which occur in most of the Canadian rivers. Here, in the unsettled districts, they are taken completely apart, and each log is allowed to find its way down into still water as best it can, when they are collected, and again lashed together. They suffer, however, very much in this process, by knocking against the rocks. In many of the settled districts, a contrivance has been invented to obviate this. I first saw it at the Chaudière Falls, on the Ottawa river, near Bytown, or, as it is now called, Ottawa City. This contrivance is called a "slide." It may be described as a canal on a slope, down which only a sufficient quantity of water is allowed to run, to carry along the timber. When a raft reaches these rapids, which extend right across the river, it is taken to pieces, and the logs are placed on cribs, which are frames to fit the slides. A couple of men stand on each to guide their course when they get through; and away they shoot, at a furious rate, down the inclined plane, without any injury. When all the logs are shot through the slide, they are again united, and the raft proceeds as before. The largest

rafts are, however, not put together till after they get below Montreal, where there are no rapids to impede navigation. They then float down to Quebec, where they are stored, at the mouth of the Charles River, in readiness to be shipped on board the timber-ships. They take many months to perform the voyage, for such a distance in the interior do they come; and sometimes do not get to their destination before the winter sets in, and stops their progress.

THE STEAM-BOAT OF THE AMERICAN RIVERS.—These are the most curious structures, and, at first sight, I was induced to say that they were very like Chinese junks. On further inspection, however, I soon discovered that, except in size and in drawing little water, they are totally different. I heard of an American shipwright boasting that he could build a boat which would not draw more than half a foot of water. Another laughed at him. "Pooh!" he remarked, "I guess now that I can build one which will go along right over the fields, provided the dew is pretty thick on the grass in the morning." The hull or floating part of the structure is of great length, and narrow, and could by no possibility bear the superstructure raised on it, were it not for a vast arch, or, rather, two vast arches, which extend on either side of the vessel fore and aft, high above the paddle-boxes, and serve to bind her together—in other

words, the hull is suspended to these arches. The paddle-wheels are very broad and large, and assist to keep the vessel on an even keel. On the hull and real gunwale of the boat is placed a platform or deck, which may properly be called the middle deck. Above this, supported by pillars, is another wide platform or deck, which may be called the main-deck. It is fitted up fore and aft as a magnificent saloon. There is a roof over the whole of it. I cannot call it a deck, for the after part is arched with an iron framework, covered in with glass, like the Crystal Palace. This saloon is highly ornamented, generally, with white and gold, and the pillars which support the roof are wreathed with flowers. It is thickly carpeted, and there are ottomans, and sofas, and chairs, and seats of all sorts, and work-tables, scattered about. Generally there is a piano at the after end, and one or more stoves. Over the stern there is an open platform or broad gallery, where chairs are placed. There are other platforms over or just abaft each of the paddle-wheels. On both sides of the saloon are sleeping-cabins, each containing two berths. They have windows, and are very airy, and prettily fitted up. Above the saloon there is a deck, or rather, it may be called a platform, about the centre of the vessel, before the funnel. Here the wheel is placed, and here the captain and officers take their stand. No passengers are allowed to go to this




AMERICAN RIVER STEAMER.

exalted spot—indeed, I never could find my way to it. There is some secret passage to it from the engine-room below, I have no doubt. On the main or saloon deck there is generally another platform forward, with glass doors opening on to it, so that the saloon can be closed. I have as yet only described one deck, this main or saloon deck. Under it is the deck where the entrance is, and which I have described as the middle deck. In the after part is a saloon and sleeping-berths, generally devoted to the accommodation of the single lady passengers, who, to the honour of the United States, always receive the greatest attention whenever they travel. In the centre part the cargo is piled up—piles and piles of boxes—between which it is not always easy to find one's way. The passenger vessels do not carry heavy goods. Forward there is the barber's shop, various offices, and the kitchen. The machinery occupies a considerable portion of the centre of the vessel. Near the entrance-port is the agent's office, where the fares are paid and cabins taken. Every steamer has a barber on board, that the gentlemen passengers may be shaved during their passage, even though it may last but a few hours. Time is valuable, and it is important to economize it. But where, it will be asked, are the dining-saloons? A bell rings, or a gong sounds, and everybody rushes downwards from the upper saloon. Down

they go, down through the middle-deck, and stop not till a third or lower deck is reached, and here, extending from the engine-room to the extreme after part of the vessel, there is another large saloon, with tables arranged along it and berths on either side; it is well lighted, and the tables are covered with a variety of eatables, while waiters are running backwards and forwards helping the guests. The provisions disappear somewhat more rapidly than in Europe, though the fare is not certainly equal to that furnished at the hotels on shore. Perhaps the passengers have to go on shore at the next stopping place, or being generally in a hurry, they have got into the habit of bolting their food; many of them look as if they habitually bolted it, and that it did not do them the good it ought to do. Perhaps on returning to the saloon a negro, or a gentleman of colour, with an enormous shirt frill and cuffs, and dressed in nankeens with a blue coat and brass buttons, appears violin in hand and exclaims, "Gentlemen and ladies who like to 'dance, come forward, please." Soon numerous damsels in low dresses, and youths not in quite such elaborate evening costume, step out from the cabins and are seen footing it merrily to the sound of the dancing-master's violin, he playing and dancing with the greatest ardour, and endeavouring to set everybody right who goes wrong in the quadrille,

of whom there are not a few among the rougher sex. Such was the vessel in which I steamed up the Hudson; the dancing, however, took place on board a steamer on Lake Erie. The most uncomfortable feeling I experienced on board these vessels was the complete separation of the passengers from those who managed them. The tinkle or two of a bell was heard and the vessel stopped, and another tinkle sounded and on she went again. There were stewards and stewardess, and a clerk who took tickets, but as to who was guiding the vessel or where she was going it seemed impossible to discover. The captain must thus be saved a great deal of annoyance, for he can never be troubled by having questions asked him. With regard to sea-going vessels, those of the United States do not differ much from the English. The New York sloop, however, is unlike any now found in British waters; her bow is sharp, and she carries her beam right aft, where her stern rises to a height considerably above the bows; she carries a narrow mainsail with a great hoist, a big foresail, and a small jib on her high steeving bowsprit; her hull is generally light green, with various devices on her stern, and she has altogether a very antique look about her, in spite of her bright paint and white sails. She is employed to trade about and in the neighbourhood of New York and Long Island. The merchant

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vessels of the United States have generally more beam than the English—they have a straight sheer, and differ much from them in their paint. The upper works are frequently white, and a broad ribbon is left where the wood is simply varnished. The American schooners have long been celebrated for their size and swiftness; they have great beam and carry a heavy press of canvas; they are, generally well formed, and in many instances are owned by the captains. Many men in the States have not gone to sea till they have grown up, and have become expert seamen.

'MUDIAN RIG.—The boats of Bermuda have for years been known for their speed and seaworthy qualities; at one time it was believed that nothing could come up with them. They carry no bowsprit, or only a very short stump of one; the sail is set on one yard like a lug with a high peak, and is split down at the mast so that the fore part acts as a foresail, and when going about it is not necessary to lower the sail. They have generally great beam, and rounded decks, when they are decked.

Leaving North America, we will run down the east coast and round Cape Horn; first, however, touching off one or two places in the Brazils. Many of the boats of that country partake very naturally of the character of those of Portugal. The Catria, which I have described, seems to be the model of most of them. Off Bahia we meet

some fine boats; they are longer than the catria, and rise more in the bows. The common market-boat has a curious variety of sails; her bowsprit steeves almost up and down; on her foremast she carries a square sail; the mainmast is stepped close to the foremast, but is so long and rakes so much that the top almost overhangs the stern; on this a fore and aft mainsail, with a short gaff, is set with a wide foot. On the mizen mast a latine sail is set, so that each mast presents a different rig. Some boats carry only the square sail and fore and aft mainsail. The Bahia fishing-boat is very long, with a single stout mast, on which a large square lug is set without any peak. These boats go in pursuit of small whales, which the fishermen strike with harpoons.

The harbour of Rio de Janeiro is full of boats. The ordinary passage-boat is built like a catria, and carries two high-peaked lugs, cut almost like latine sails. Over the after part there is an awning like that of a Douro Toldo boat, under which the passengers sit.

THE BRAZILIAN CATAMARAN, or GONGUADA, is a curious contrivance. The floating part is composed of numerous inflated skins of hogs, or some other animal, all fastened together. On these a platform is placed, and above it is another, which, resting on the deck forward, rises gradually astern. At the after end there is another small platform, on

which the helmsman stands. The after part is covered over with a roof, or rather a tilt, the interior of which serves for a cabin. It has one sail set on a single mast, of a triangular shape. The head is hoisted to the upper end of the mast, and it is extended by a yard, the jaws or heel of which is not at the foot, but some little way up the mast, so that the foot and tack of the sail is much below it. It is steered by a long oar, and propelled by two oars forward. It is a craft of very curious construction. I will not stop to describe the dug-out canoes of the savages of Patagonia and Terra del Fuego, but we will get round quickly to the west coast of South America. Here, on the coast of Peru, another curious craft is used for passing through the heavy surf which sets on the shore. Captain Basil Hall describes it very well:—"The balsa is made of two entire seal-skins inflated, placed side by side, and connected by cross pieces of wood and strong lashings of thongs. Over all a platform of cane mats forms a sort of deck, about four feet wide and six or eight feet long. At one end the person who manages the balsa kneels down, and, by means of a double-bladed paddle, which he holds by the middle and strikes alternately on each side, moves it swiftly along, the passengers or goods being placed on the platform behind him. The buoyancy of these balsas enables them to cross the surf in safety, and without

wetting the passengers, at times when an ordinary boat would inevitably be swamped. All the goods which go to the interior, at this part of the coast, are landed in this manner. The great bars of silver, and the bags of dollars also, which are shipped in return for merchandise landed, pass through the surf on these tender though secure conveyances.

BRAZILIAN BALSA.

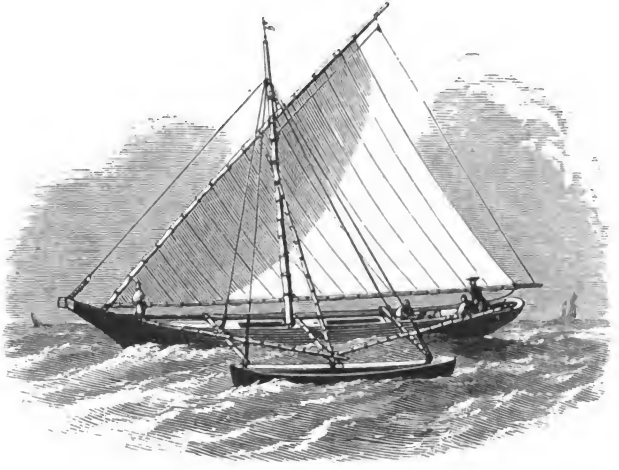
Near Huanchaco, on the coast of Peru, the sea constantly breaks on the beach with great fury. On that coast a peculiar kind of balsa is used, made of straw, which the fishermen call a "caballíto" (a little horse), from the mode in which they bestride it as they paddle through the breakers. It consists of two large bundles of straw or rushes,

formed in a conical shape and bound close together, leaving a small hole in the large end, in which small parcels are sometimes carried. The apex of the cone is turned up in a slender point, like the shoe of a Chinese. The balséro sits astride on his little horse for greater security while he is paddling through the surf; but as soon as he gains the open sea and is in comparatively smooth water, he tucks up his legs and places himself in the hole I have described, clear of the water, and out of the sight of any prowling shark who might take a fancy to his toes. He uses a double paddle, like that of the Esquimaux which I have before described—that is, with a blade at each end. With this, clothed in a straw hat and coarse shirt and trousers, he manages his little sea-horse, instead of with a rein, with wonderful dexterity. This kind of balsa has an advantage over those of inflated skins, as it cannot be injured, as they are by being cut or pricked by anybody who may have a quarrel with their owners. Sometimes the owners of the skin-balsas have disputes, and when out on the ocean they will attack each other, one trying to cut a hole in his opponent's balsa, when the loss of one or both of these air-filled vessels is the consequence, the balséros having to swim on shore to preserve their lives.

We must now leave the coast of America, and wander about among the almost numberless islands

scattered throughout the Pacific, where we shall find canoes of every variety of form, size, and principle of construction.

THE FLYING PROA OF THE LADRONE ISLANDS.—This is supposed to have been the original of all the craft with outriggers in the Indian Seas and



FLYING PROA OF THE LADRONES.

Pacific, and I shall therefore describe it first. It fully deserves its name, for no other boat or canoe of any description can compete with it in speed. The principle I have already described. The sail is almost triangular, but the yard is straight,

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of either fir or cedar, both of which woods grow in abundance on their islands. The merchant junks vary according to the purpose for which they are intended. The pleasure boats are numerous, and of different sizes. They are generally impelled by oars. The larger pleasure boats have two decks. The cabins in the lowest are low, but above them is another, lofty, of large size, and handsomely ornamented, like those of the Chinese. It has open windows, and can be divided into separate compartments by means of screens and bulkheads.

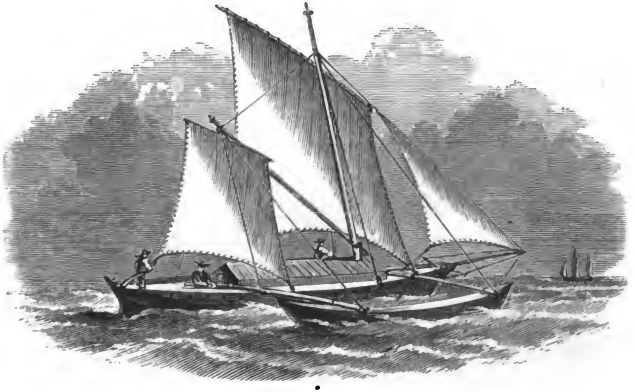
The merchant vessels are generally one hundred and twenty feet in length, and twenty in breadth. They are fitted with sails as well as with oars. They taper to a point from the midship board to the bow, and the two ends of the keel rise considerably out of the water. The body of the vessel is not convex, as in all European vessels, but the part which is below the water mark runs almost in a straight line towards the keel. The stern is broad and flat. A very curious peculiarity of it is that it has a large hole or port in the centre, quite low down, through which the whole interior of the vessel may be seen. This port was originally a rude contrivance either for working the rudder, or for unshipping it and bringing it on board, but the government now compel all vessels above a certain size to have it, that they may be

thus less sea-worthy, and that their crews may not be tempted to go to a distance from the coasts of their ancestors, and introduce among them the manners and customs of the surrounding barbarous nations of the world. The deck of the junk rises towards the stern, and is widest along the sides. It is formed of loose planks of fir which are not fixed or fastened together, and, when she is fully laden, are but little above the surface of the water. A cabin or rather upper deck covers the whole vessel, a small space only being left open at her stern, for the stowage of anchors, cables, &c. This house projects nearly two feet beyond each side of the vessel, and the sides are full of windows, which are glazed, and can be opened at pleasure. It is divided into separate cabins by screens, and ornamented like those of the Chinese. The upper deck is flat, and formed of planks well joined together. These vessels carry but one mast, which can be lowered by a tackle much in the fashion of a Thames barge. It lowers down on a rest on this upper deck, and over it at night the sails being spread, with an additional covering of straw, a shelter is formed, under which the seamen sleep. The anchors are of iron, and the cables of a sort of straw, twisted so that it is of very considerable strength. These junks carry only one sail, which is made of canvas, and is of great size. When it is calm, thirty or forty oars are used. The rowers

and the outer leech does not extend far astern of the mast. The foot is stretched on a boom, the full length of the canoe. The mast, boom, yard, and outrigger are of bamboo. The sail is made of strong matting, which is stretched, by the mode I have described, as flat as a board. When going about, they have merely to shift over the sail, so that what was before the head at once becomes the stern. When the sail is reefed, it is rolled round the boom. These proas carry six to seven people. One sits in the stern to steer, and another in the bow, ready to steer when the craft is put on the opposite tack; the rest are employed in baling out the water or in trimming the sail. No craft ever known can sail so close to the wind, the flatness of the lee side effectually preventing it from making any lee way; while its narrowness, and the large sail it is able to carry, give it extraordinary speed. The great body of the sail is also completely within the boat, It is also quickly reefed, by lowering the halliards, and rolling the foot round the boom; indeed, it is impossible to conceive a craft more admirably adapted for the object required. The Ladrone Islands, lying chiefly north and south of each other, within the limits of the trade winds, have always what is called a "soldier's wind" either on one side or the other, or, at all events, the wind blows from such a point, that, sailing as close as they do to it, coming from

the most leeward island, they can nearly always fetch the weathermost.

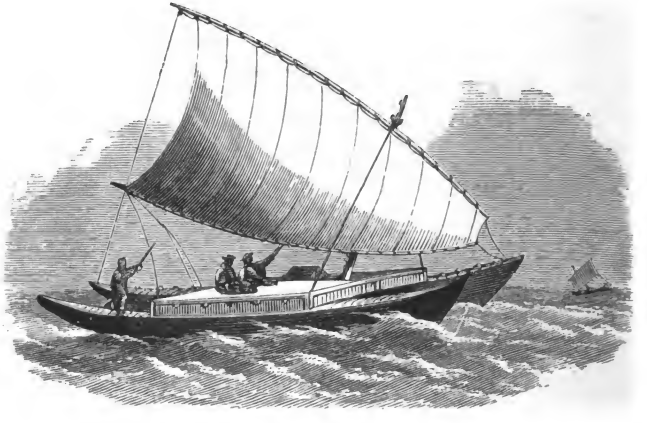
CANOES OF THE FEEJEE ISLANDERS.—Captain Wilkes, commanding a United States exploring expedition, visited the Feejee Islands, and describes their canoes as superior to those of the other groups. They are generally built double,



OUTRIGGER CANOE OF FEJEE ISLANDERS.

and some are one hundred feet in length. The two parts of the double canoe are of different sizes, and united by beams, on which a platform is laid. The platform is fifteen feet wide, and extends beyond the sides. The smaller canoe serves the purpose of an outrigger. The bottom of the canoe is a single plank, and the sides are

fitted to it by dovetailing, and closely united by lashings, while the joints are made tight by gum. They have generally a depth of hold of seven feet. Captain Wilkes particularly describes another canoe of Feejee origin, which visited his ship when off the Tonga Islands. "She was one hundred feet in length, and of the double kind, which



DOUBLE CANOE OF FEEJEE ISLANDERS.

consists of two canoes of different sizes, joined together by a deck thrown across them both. On this deck a small house is constructed, which serves for a cabin. Above the house was a small platform, eight feet square, with a railing on each side; the mast, which is thirty feet long, is sup-

ported by guys, having a long yard attached to it, with its neat sail, of huge dimensions, furled. In all canoes, both single and double, small hatchways are left at both ends, with high combings; and when they are under way, a man is always seen in each, baling out the water. The mode of propelling the canoe by sculling is peculiar to the Tongans and Feejees. The sculler, instead of using the oar as we do, stands behind it, and holds it perpendicularly. The oar has a broad blade, and is ten feet in length; the sculler has thus the whole weight of his body to assist his arms in using it. It is confined in a hole in the platform. There is generally one of these oars at each end, and the crew are enabled to propel one of these large canoes between two and three miles an hour by means of them. The Tongans are great adepts in managing their canoes when under sail. They sail much more swiftly on a wind than before it. The kings of Tonga, with their chiefs and a number of their people, were on board the canoe above described; and as she approached the ship she had a very fine appearance."

THE SAMOAN CANOE is very different to that of the Feejee islanders. There are no double canoes in Samoa. The usual fishing-canoe is made out of a single tree, with an outrigger to balance it. The larger canoes are from thirty to sixty feet in length, and carry from ten to twelve persons.

They are formed of several pieces of plank, joined together by sennit. These pieces are of no regular shape. On the edge of each plank is a ledge or projection, which serves to attach the sennit, and to bind it closely to the adjoining one. The gum from the bark of the bread-fruit tree is used to cement the pieces, and to prevent leakage. They are long, narrow, and of elegant shape, and have a deck forward and aft. The natives who paddle them sit two abreast, while another steers. The seat of honour is on the deck forward. In the centre of the stern is a row of pegs, to which, by way of ornament, the large white ovula shell is attached. The natives sit with perfect ease on this place; but a stranger has the greatest difficulty in occupying it, and feels that he may any instant be toppled over into the water. Having both a bow and stern, these canoes cannot be manœuvred without tacking; consequently, the outrigger, on which their safety depends, is, in using their sail, alternately to leeward and windward, and does not, when to leeward, add much to the stability of the canoe. They carry less sail than the canoes of the other natives of Polynesia; and to guard against the danger of upsetting, the natives rig a sprit or boom projecting from the opposite side to that on which the outrigger is fitted. This boom is secured with guys to the top of the mast. When the wind blows

fresh some of the men go out upon it, and thus balance or counteract the force of the wind. Those on the other side of the canoe are kept ready to go out on the outrigger when that becomes necessary. The sail is made of a mat of a triangular shape, with its apex below. Some of them are ten feet high. None of these canoes are calculated to perform long voyages.

DOUBLE CANOE OF NEW GUINEA.—Savage as are the natives of New Guinea, they manage to build canoes of great size. H.M.S. *Bramble*, while engaged in a survey of the coast, fell in with one of them, which is described as sixty feet in length. The two canoes were kept apart, and at the same time united by a platform fifteen feet broad, extending nearly their entire length. The after end was left clear, and on it stood three helmsmen, each provided with a long paddle for guiding the craft. The rest of the stage was covered by a house about six feet high; and the roof, being flat, made as it were a second or upper deck. The craft had two large sails of matting, each spread between two bamboo masts, with diagonal poles on either side supporting them. The masts were about twenty feet apart. There was a square sail forward on a mast of its own, and other small sails were set on the two principal masts. Flags and pennants flew from the mastheads, and there were from forty to fifty people on the upper deck, armed with bows

and arrows, and spears. It was not ascertained where this curious craft came from, or to what place she was bound.

CANOES OF NEW ZEALAND.—But a few years ago, the New Zealanders possessed no other vessels than those I am about to describe; but at the present day many own cutters, schooners, and brigs, built after the English fashion, and manned entirely by their own people. They have two sorts of canoes, single and double. The single canoes are built of the largest sized pine-trees, which grow to the height of forty or fifty feet. The logs are hollowed out, and lengthened eight feet at each end, and raised about two on each side. They are built with a figure-head; the stern-post extending about ten feet above the stern of the canoe, which is handsomely carved, as well as the figure-head, and the whole body of the canoe. The sides are ornamented with pearl-shell, which is let into the carved work; and above that is a row of feathers. On both sides, fore and aft, there are seats in the inside, so that two men can sit abreast. They pull about fifty paddles on each side, and many of them will carry two hundred people. When paddling, a chief stands up and cheers the crew with a song, while they all join in chorus. They pull at the rate of seven knots an hour, but roll heavily. Their sails are composed of straw matting in the shape of a latine sail. The crew cook in their canoes, but

always go on shore to eat. They are known to go frequently three or four hundred miles along the coast. They have no outrigger; their paddles have spoon-shaped blades. Captain Wilkes speaks of their being propelled with great swiftness. They are cut out of the Kaurie and Kaikotia pines, which are also now much used for the masts and spars of large ships.

DOUBLE CANOES OF NEW ZEALAND.—In some parts of New Zealand double canoes are used. They are joined by platforms like those of other tribes, and are carved in the most elaborate manner. At the after end there is a raised deck with an awning of mat-work, a sort of hut, over it. Here the chief sits and issues his orders to the crew. Some rise ten feet and upwards at the stem and stern, while others of a more ordinary description only rise at the bows, and appear to be very much less carved. In some there is a raised seat like an arm-chair, which forms the stern of the canoe. This is elaborately carved and ornamented with shells and feathers, and has the head of some monster worked on it.

Probably, throughout the wide-extending waters of the Pacific other contrivances for carrying people over their surface may be found, but I believe that I have given the characteristic features of all the various sorts of canoes which have been met with by voyagers in those regions.

## CHAPTER XIII.

MODERN SHIPS—BOATS AND MODELS—A DESCRIPTION OF THE "ROB ROY" CANOE—CONCLUSION.

In ship-building, as in many other arts, great progress has been made during the last few years, and all sorts of novel inventions and contrivances have been introduced. This progress has, however, been continuous from an early age, and a very great difference will be found between the *Great Harry* and the *Victory*—almost as great as between the *Victory* and the *Achilles*, or any of our armour-plated ships. I cannot profess to mention more than a few of the alterations. Not only are ships now entirely built of iron, but their masts are formed of the same material. They are hollow tubes, and the running rigging is sometimes let down them, so that it may escape being injured by shot, unless the masts themselves are shot away. Most of the iron ships are built in compartments, so that should a shot knock a hole in one part, and let in the

water, the ship may float till there is time to let it out again. Ships are provided not only with engines to drive them along, but with donkey-engines to do all sorts of work on board, to pump out water, hoist in the stores, and work round the capstan. The large boats called launches are now generally fitted with engines, and are to be seen puffing about in all directions round a fleet, going much faster than their crews could formerly urge them on, although they have not much to boast of in the way of speed. They are generally fitted with the twin-screw. A new style of boat, with a steam-engine, has lately been built for men-of-war, by White of Cowes, which has more capacity, and far greater speed than the old launches, which it is to be hoped it will supersede. A wonderful little machine, called an Hydraulic Jack, has been introduced on board men-of-war for the purpose of lifting the carriages of the huge guns, or any other great weight. It can lift the deck, with all the guns on it, sufficiently to remove an iron stauncheon out of its socket. In appearance it is like a short stout pump, and one man can carry it with ease.

Steam has now been introduced on board numerous yachts. Even many yachts' boats are fitted with steam-engines, which do not appear to be much larger than good-sized tea-urns. They are of the greatest convenience, as a gentleman may

now go away with a large party, carrying only one man to manage the engine. All these boats are fitted with screws—many sailing yachts have them. Other principles have of late been introduced for moving vessels without screws or paddles. The most remarkable is the hydraulic or jet propeller, with which the *Waterwitch* armour-plated steam gunboat has been fitted. The water is allowed to pass in from the sea through a sort of sieve in her bottom; it is then taken up by a turbine-wheel, or centrifugal pump driven by steam, and cast out with great velocity in a backward direction, through trunks in the side of the ship. She is thus driven along by the mere action of the water forced aft. Her stem and stern are alike, with a rudder at each end. The propeller is reversed from the deck by turning a large three-way cock, without reversing the engines. She has been made to go between eight and nine knots an hour, which is a much less speed than that a vessel of the same build might attain if forced along by a propeller; but probably improvements will be made, and far greater speed attained.

Numerous important objects have to be attained in men-of-war—the power of carrying heavy guns, protection for men and machinery, or invulnerability, speed, capacity, sea-going quality. A ship may be made practically invulnerable, but probably by the sacrifice of her sea-going qualities.

The aim has, therefore, been to combine the two qualities. The *Warrior* was the first iron sea-going armour-plated ship built in England. She is invulnerable only in the centre, where she carries a shot-proof battery, but both her ends are wholly unprotected.

The *Black Prince* and *Achilles* were built on nearly the same lines, but the *Achilles* has complete protection all round her water-line, and is both inside and out a fine specimen of a fighting ship,

The next class of ships built were the *Minotaur*, already described, the *Agincourt*, and *Northumberland*, which have complete protection, except at the bow. A water-tight bulkhead, however, runs across it, so that should a shot enter and let in the water, the ship would not sink. The crew in action are withdrawn from that part of the ship. Besides this, from the shape of the bow, even if struck, the shot would in most instances glide off,

The *Bellerophon* is a magnificent sea-going ship, calculated to go fast either when sailing or steaming, and is well, though not entirely protected. The *Hercules*, on the other hand, has very heavy armour plating and backing, and is made as strong as possible, so that she could not have a more appropriate name than the one she bears. She, as well as the *Penelope*, *Pallas*, and *Research*, all armour-plated, have recessed ports which allow an increased training to most of the guns.

The *Penelope* and *Vixen* are fitted with two screws already described.

I alluded to the turret or cupola ships in a former chapter. Some have been built expressly to carry turrets, like the *Surprise* and *Wyvern*. Others have been converted, like the *Prince Albert* and *Royal Sovereign*. They are intended more for harbour and coast defences than for sea-going ships—that is to say, for long voyages—at the same time that they are capable of keeping the sea in very bad weather. I went all over the *Royal Sovereign*, and will describe her. She was once one of our finest three-deckers, like the *Marlborough*, of which an illustration has been given. Her taunt and graceful masts, and her three upper decks, were taken off her, and her lower deck alone remained. Massive plates of iron were now fastened to her sides and over her remaining deck, and she became armour-plated. Next, four cheese-like constructions of thick iron were placed fore and aft on this deck, or rather sunk into it, and made to rest on the orlop, or which is now the lower deck. They are hollow—three of them contain each one huge gun, carrying a shot of 300 lbs., and the fourth and foremost carries two guns. These four turrets, which together occupy the greater part of the deck, are made to turn by means of machinery, so that their guns can point in nearly every direction. There is just room to allow the guns to be run in

and out, sufficiently to load them. There is only one port, which can be closed by an iron shutter. The after-gun cannot point quite aft, nor the foremost quite forward, while it is obvious that the guns in the three centre turrets cannot point by several degrees fore or aft—but again, by turning the turret, they can be fired on both sides. The muzzles of the guns are only a little way above the deck. The bulwarks are of iron, and secured by hinges, so that when the guns are to be fired they are allowed to drop over the sides. The shrouds also are unhooked, and brought in and secured round the masts, so that the guns have free play in almost every direction. At a short distance only her turrets and stumpy masts appear above the water. On her deck, as indeed on the deck of most of the iron-clads, is a circular box about the middle of the deck, rather higher than the turrets. This is the captain's fighting-box. Here he takes his stand, and by means of tubes can communicate with the engineers, the helmsmen, and with each of the turrets. The wheel, indeed, is placed in the centre of the ship, near him. The interior is, of course, fitted up very differently to old-fashioned ships, but is not quite so uncomfortable and close as might be supposed. The captain's cabin is right aft. The gun-room is next to it, on one side, and the officers' cabins are arranged on either side. The midshipmen's berth is scarcely so large as that of a ten-gun

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brig in days of yóre. The turrets and their machinery of course occupy a larger portion of the centre part of the deck—still, there is room between them and the sides to sling the hammocks for the crew. These new-fashioned ships alter our preconceived notions of the romance of a sea-life, yet a person may very soon get accustomed to them, and look upon a three-decker with a very different feeling to what was experienced formerly; she is no longer an example of nautical power. Her beauty and grace remain, but when we remember that, in spite of her 120 guns, one of those dark, low iron-clad monsters, with four or five guns only, could send her to the bottom in a few minutes, we look at her with compassion, as we do at a noble stag surrounded by hounds about to pull it to the ground. Britain may still rule the sea as of yore, but we must accept it as a fact, whether we will or no, that the wooden walls of old England are things of the past.

This is the day, certainly, of nautical inventions and experiments, and our preconceived notions of the fitness of things are being continually upset. The people of the United States, especially, have made some of the most daring improvements, of which, in many instances, we have not failed to take advantage.

One of the most curious is the *Nonpareil* life-raft, which crossed from New York to Southampton,

where she arrived on Thursday, 25th July, 1867, with three men on board, having performed the voyage in forty-three days.

The portion of the raft in the water consists of three India-rubber waterproof cylinders, with pointed ends, each 25 feet long by 2½ feet in diameter, connected at their centres by a waterproof sacking. These are strongly secured by ropes to a wooden frame or staging, 21 feet long by 12½ feet wide. The base of this frame consists of seven stout 10-inch planks, and running fore and aft amidships; on the top of these are three other planks of the same thickness, the centre one projecting about 5 feet beyond the after-part of the frame, and through the end of this plank the rudder is worked, the lower part being secured by iron stays. The raft has two masts, the foremost being rigged as a lugger, and the mainmast like a cutter. Instead of a cabin, a tent was formed of a water-proof cloth hung over a boom. Under this the crew slept, two at a time, the third steering. A bellows is attached to the raft, for refilling the tubes with air. They cooked their food over an oil-lamp, the only fire they possessed. Their provisions were stowed in a locker under the tent, while their water, of which they had an abundant supply, was contained in a number of casks lashed to each side of the raft. Although they had a fortnight's bad weather, during which the raft had frequently to lay to, the

men did not get wet; even under these circumstances, the raft behaved remarkably well. A short time before this a small life-boat crossed the Atlantic, called *The Red, White, and Blue.* A third craft of small size following, was upset, and all her crew were lost, with the exception of one man, who clung to the bottom, and was picked off after several days' intense suffering, more dead than alive. Under some circumstances, the *Nonpareil* American life-raft might prove useful, but most people would prefer a voyage across the Atlantic in a comfortable liner.

While ship-building has been improving, so is model-making, and there are now several men who make a livelihood entirely by model-building. There are two at Sandown, and one at Shanklin, in the Isle of Wight, whose sailing models are of a very superior description; they are very stiff, carrying a great deal of canvas, and are very fast for their size. A yacht-sailor told me that he fell in with one cruising by itself to the westward of Ryde, and going along as steadily as if it had a crew on board. It had evidently got away from its owner. I was much pleased with the models of Mr. Baker, of Sandown. They are to be got of Messrs. Zimmerman, Barker & Vernon, 7, Bishopsgate Street Without, and also of Mr. A. J. Coles, 30, Cannon Street, St. Paul's.

Another builder at Sandown, Boyce, supplies

Mr. Cremer, of Regent Street and Bond Street, with models.

I have already mentioned the Model Dock Yard, in Fleet Street.

Mr. Baker's models are very shallow, compared to those I have before described. The proportions are about as follows :—

Three feet in length, seven inches deep, independent of keel and bulwarks, and eleven inches wide. The bow should be about fourteen or sixteen inches long.

The extreme breadth is carried right aft to the stern.

The floor is almost flat, and the bilge nearly square, and as the vesel for her length has great beam, this gives wonderful stability. This form is carried a long way aft with a slightly hollow run, to enable the water to act on the rudder, but at the same time, even at the stern the vessel has good bearings. The bow is very long and fine, and hollowed below the water, on a principle which is called the wave-line, the hollow being continued right aft to the stern. A vessel thus formed cuts her way through a sea which, as it reaches the hollow, lifts her up, while the bearings or bulk she has aft prevents her sinking into it and being pooped. When a vessel of this build, that is, with a broad stern and good bearings aft, is struck by a following sea, she is lifted up above

the sea, whereas one with a narrow stern and fine run was often pooped—that is, instead of being lifted, the sea broke on board her. In a model, the great advantage of this build is stability, and the power of carrying a large spread of canvas. It is extraordinary what a large amount of lead such a vessel will carry on her keel. I would advise my readers to form their models according to the plan I have just described, rather than after that I suggested in the first chapter. The difference they will observe is in the length of bow, and in carrying the beam and floors right aft. The shape is certainly not so attractive to the eye; the square bilge especially is very ugly, but that is only seen when the vessel is out of the water. The sailing qualities of the new style are infinitely superior.

A new style of rudder has been introduced—it is in shape like half a boat, with the broad part uppermost. On this part something like the fan of a screw is fastened horizontally. This catches the water, which is forced up from the bottom of the vessel, and thus the rudder acts with much greater power. It is called the Fish-tailed Rudder, from the appearance it presents, and is the invention of Dr. Crofts.

The rudder of a model should be well hung, and the outer edge should be heavily weighted with lead. Thus, when on a wind the vessel heels over, the rudder of course goes over to leeward, and thus

prevents her from getting into the wind, which a model is very apt to do. By means of this weighted rudder, a vessel can be steered across a pond with great exactness.

As the art of model-making has scarcely yet been brought to perfection, and as improvements are constantly being made, I propose preparing a supplement to this work, which can then be obtained at the publishers', in which I shall introduce all the most recent improvements and hints and suggestions which I can collect, with a list of all the best model-makers, and the prices they charge.

And now, lastly, but not least in point of interest, though it may be in size, we come to an account of a craft which has deservedly become more celebrated than many yachts of far larger dimensions—the *Rob Roy* canoe. The old *Rob Roy* canoe performed a voyage of a thousand miles through Germany, Switzerland, and France, while the new *Rob Roy* canoe went up the Baltic, and traversed a considerable part of Norway and Sweden. A sensible yachtsman desires, I conceive, to have a vessel which will at the same time be fast, be a good stout sea-boat, and will afford comfortable accommodation below. The objects Mr. Macgregor had in view when designing the *Rob Roy* canoe, were of a similar character. He wanted a travelling canoe, which would sail well,

paddle easily, and bear portage and rough handling, and at the same time be light. All these objects seem to have been attained. The *Rob Roy* weighs, with all her fittings, 71 lb. A canoe ought, Mr. Macgregor observes, to fit a man like a coat, and to secure this the measure of the man should be taken for his canoe. The first regulating standard is the length of the man's feet, which will determine the height of the canoe from keel to deck; next, the length of his leg, which governs the size of the "well," and then the weight of the crew and luggage, which regulates the displacement to be provided for. The following description is for a canoe to be used by a man 6 feet high, 12 stone weight, and with boots 1 foot long in the sole. The *Rob Roy* is built of the best oak, except the top streak of mahogany, and the deck of fine cedar.

The *Rob Roy* is decked completely over except where the occupant sits. She has a mast and sails, which can quickly be lowered or raised, and is propelled by a double-bladed paddle. It is most important to have a stiff craft, which can be urged steadily through the water.

Let Mr. Macgregor describe his own craft:—

"The woodcuts at pages 323 and 328 represent, on a scale of an inch to the foot, figs. 3 and 4, cross sections at the beam and at the stretcher; figs. 9, 10, and 11, the backboard and the apron; the rest of the drawings showing particular

FIG. 3

FIG. 4

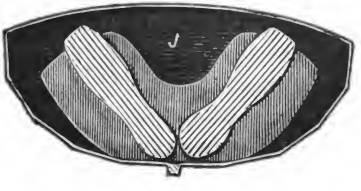



FIG. 5

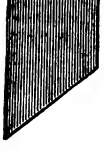
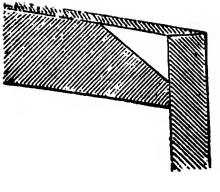


FIG. 6



portions more minutely. The principal dimensions are:—Length over all, A S, 14 feet; from stem to beam, B, 7 feet 6 inches; beam, outside (6 inches abaft midships), 26 inches; depth from top of deck at C, fore end of the well, to upper surface of keel, 11 inches; keel, depth outside, 1 inch, with an iron band along its whole length, $\frac{3}{8}$ inch wide; camber, 1 inch; depth at gunwale, $8\frac{1}{2}$ inches. The upper streak is of mahogany, and quite vertical at the beam, where its depth is 3 inches. The garboard streaks and the next on each side are strong, while the next two on each side are light, as it is found that they are less exposed than the others, particularly in a canoe where all these lower streaks are of oak. The stem and stern posts project over deck, so that the canoe, if turned over, will rest on these points, and on the upper edge of the combing, round the well, $\frac{1}{8}$ inch deep, projecting $\frac{1}{2}$ inch, of steamed oak, curved at the corners, and adding, by its angular position, very much to the strength of the deck about the well. The well is 32 inches from C to D, and 20 inches from E to F, so placed that D M is 2 feet, and thus the beam of the boat being aft of the midships the weight of the luggage G, and of the masts and sails stowed forward, brings the boat to nearly an even keel. The additional basket of cooking things at I (fig. 2) brings her a little by the stern. For a boat without luggage

the beam should be 1 foot abaft midships to secure an even keel.

"The deck is supported on four carlines forward and three aft, the latter portion being thus more strengthened, because, in some cases, it is required to support the weight of the canoeist sitting on the deck with his legs in the water. Each carline has a piece cut out of its end (see fig. 6), so that the water inside may run along to the beam when the canoe is canted to sponge it out. The after end of the carline at C is bevelled off (fig. 5 in section), so as not to catch the shins of your legs. All the carlines are narrow and deep, to economize strength, and the deck is screwed to them with brass screws, so that it might be removed for internal repairs. A flat piece is inserted under the deck at the mast-hole H, which is also furnished with a flanged brass ring. The deck is so arched as to enable the feet to rest comfortably on the broad stretcher J (fig. 4), the centre of it being cut down in a curve, in order that the mast and sails, rolled together, may rest there when there is no luggage, and be kept under the deck, but above any wet on the floor. When there is luggage (as in this voyage), I usually put the mast and sails under the after deck. The cedar deck round the well at E F is firmly secured by knee-pieces, and the boat may thus be lifted up *by any part*, and may be sat upon *in any position* without injury.

The luggage for three months, weighing 9½ lbs. is carried in a black leather-cloth bag, 1 foot by 1 foot by 5 inches deep (G, figs. 1 and 2).

"A water-tight compartment may be made by an after bulkhead, with a lid to open, so as to allow the air to circulate when on shore.

"The floor-boards, about 2 feet long, rest on the timbers until, at the part below C (fig. 2), they end at P P (fig. 7), in notched grooves, which fit into short oak pieces M N, ¼ inch thick, sloping forwards on each side of the keel O. Their ends rest on the garboard streaks, and so lower the heels nearly 1 inch below the level of the floor-board on the top of the timbers. The canoeist sits on the floor-boards. I prefer this to any cushion or mat whatever; but of course these can be used, but they should be firmly fixed, especially in rough water. The canoeist's knees touch the combing and the apron boards, while his heels touch the keel. Thus the dotted lines in fig. 1, from the stretcher to the deck, show how the shin-bones are supported in comfort, enabling the paddler to sit for hours together without straining. But comfort is additionally secured by my new kind of backboard, shown in figs. 8 and 9, in section and elevation. This consists of two strips of oak, 18 inches long, 2½ inches wide, and united by a cross piece at Y, and another at X, the latter being grooved (fig. 8), so as to rest on the top of

the combing, and to oscillate with the movement of the canoeist's back, which is thus supported on both sides along the muscles, while the spine is untouched between the strips. The dotted line U fig. 8) is a strong cord passed round all (through a hole in the deck or two eyes), and this serves to keep the backboard in general upright, while it is free to vibrate, or, when on shore, to be closed down flat on deck or to be removed entirely in a moment by unloosing the cord. The use of this backboard is a leading feature of the canoe, and adds very much indeed to the canoeist's comfort, and, therefore, to his efficiency. The length and width of the oaken strips, and the width of the interval between them, ought to be carefully adjusted to the size and build of the canoeist, just as a saddle ought to fit a horse, and its rider too.

"The paddle is 7 feet long, flat-bladed, with a breadth of 5 inches in each palm, which is copper banded, and made of the best spruce fir, the weight being little over 2 lb. The spoon-shaped blade is better for speed, and a longer paddle is suitable for a racing-boat; but for a travelling canoe, where long paddling, occasional sailing, and frequent 'shoving,' require the instrument to combine lightness, straight edge, handiness, and strength, it is found that a short paddle is best for the varied work of a protracted voyage. Leather cups have been usually employed on the wrists of the

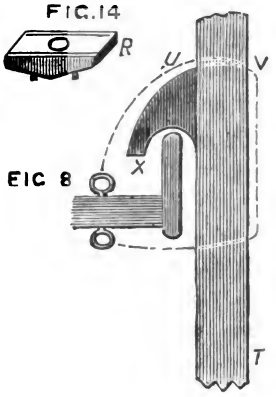


FIG.14
R
U
V
FIG 8
X
T

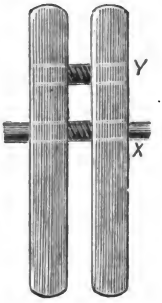


FIG. 9
Y
X

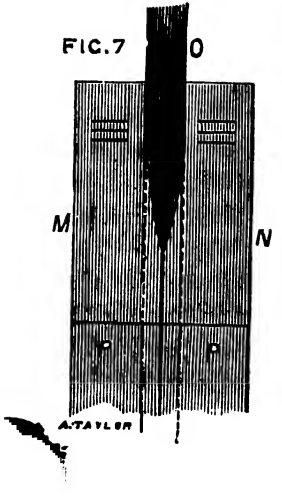


FIG.7
O
M
N
P
P
A.TAYLOR

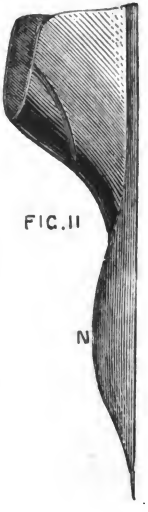


FIG.11
N

FIG.10
N

paddle to catch the dripping water, but round india-rubber rings look much better and answer every purpose, if placed just above the points where the paddle dips into the water in an ordinary stroke. These rings may be had for twopence, and can be slipped on over the broad blade.* If necessary, two are used on each side, and they bear rough usage well, while if they strike the cedar deck no injury is done to it.

"After numerous experiments, the following very simple plan has been devised for a waterproof apron, and its application at once removes one of the chief objections to canoes in rough water, as heretofore constructed. It is necessary to have a covering for the well which shall effectually exclude the water, and yet be so attached as not to hamper the canoeist in case of an upset, or when he desires to get out of the boat in a more legitimate manner. These desiderata are completely secured by the new apron, which is not permanently attached in any manner to the boat, but is formed as follows:—A piece of light wood, of the form in fig. 10, 2 feet long and 3 inches deep at the deepest part, is placed along each side of the deck verti-

* The paddle of an Esquimaux kayak, lately examined, was 6 feet 11 inches long, and 5½ inches broad in the palm, and the ends had the corners rounded off. The Esquimaux use a piece of fish skin wound spirally along the paddle, in place of the rings above mentioned.

cally, so as just to rest against the outside of each knee of the canoeist, and then a piece of macintosh cloth (drab colour is best) is tightly nailed along and over these, so as to form an apron, supported at each side on z (fig. 11), and sloping from the highest part forwards down to the deck in front of the combing, over which its edge projects 1 inch, and then lies flat. The other or after end is so cut and formed as to fit the body neatly, and the ends may be tucked in behind, or, when the waves are very rough, they should be secured *outside* the back board by a string with a knot. When this apron is so applied, and the knees are in position, their pressure keeps the whole apron steady, and the splash of small waves is not enough to move it. But for rough water I place a string across the end and round two screw nails on the deck; or an india-rubber cord may be run through the hemmed end, and catch on a beading at the fore-part of the combing.

"A button-hole at the highest point of the apron, near the waistcoat, allows it to be supported there; but the whole affair will at once separate from the boat in an overset or sudden leap out, and can be lifted off and folded up in two seconds. When you have to get out on shore, or when sailing, it is usually best to stow the apron away, so that the legs may be turned into any desired position of ease. The apron I used in this tour has answered

Fig. 1.

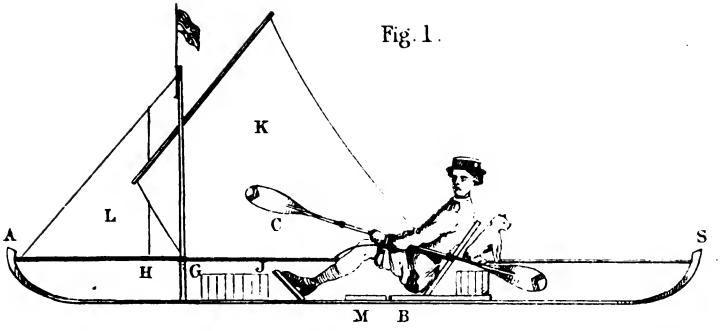
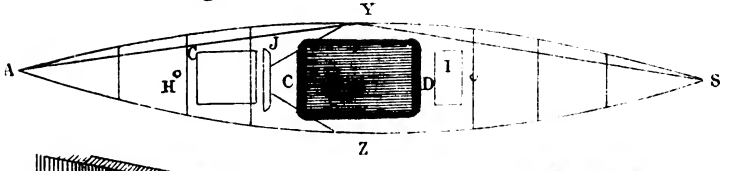



Fig. 2.



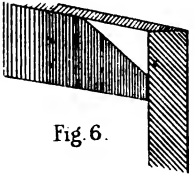
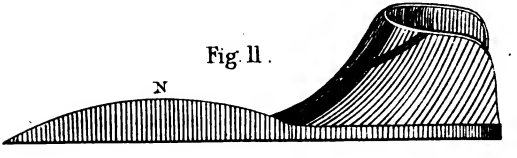



Fig. 6.

Fig. 5.

Fig. 10.

Fig. 11.




*Scale of Figs. 1 & 2, ¼ of an inch to the foot.*

perfectly, but it is to be recollected that it has been perfectly fitted by myself to me and the boat. Several others, roughly made for other canoes, have, as might be expected, failed to give satisfaction.

"One important advantage of a canoe is the capacity for sailing without altering the canoeist's seat; and we shall now describe the mast and sails found by experience to be the most convenient after three masts had been broken, and eight sets of sails had more or less failed. The mast is $1\frac{3}{4}$ inch thick (tapering), and 5 feet 6 inches long, of which the part above deck is 4 feet 9 inches. The lug-sail K (fig. 1) has a yard and a boom, each 4 feet 9 inches long, so that when furled the end of the boom and mast come together. The fore-leach is 2 feet long, and the after-leach 6 feet 6 inches, giving an area of about 15 square feet. The yard and boom are of bamboo, and the yard passes into a broad hem on the sail head, while the halliard is rove aloft through a small boxwood block $\frac{3}{4}$ inch long, and with a brass sheave, and through another (a brass blind pulley) well fastened on the side of the mast near the deck, so that the sail can be lowered and hoisted readily. The lower joint of a fishing-rod, 4 feet 9 inches long, is a spare boom. The tack end of the boom is made fast to the mast by a flat piece of leather, lashed to its upper part and to

the mast, and so as to be free to swing in every direction; after many other plans had failed this was quite successful, and lasted through the whole voyage. No hole is made in the mast, and no nail or screw driven into it, for these are causes of weakness. Two cord loops, about 6 inches apart, near the mast-head, support the flagstaff, of bamboo-cane 2 feet long, and with a silk flag 7 inches by 9 inches. When the mast is not used this flag-staff is detached and placed in the mast-hole, which it fits by a button 2 inches wide, permanently fixed on the staff, the lower end of which rests in the mast-step. The halliard and sheet should be of woven cord, which does not untwist, and is soft to handle in the wet. The sheet when not in hand may be belayed round a cleat on deck on either side of the apron, where it is highest, and thus these cleats are protected from the paddle.

"For the sake of convenience the mast is stepped so far forward as to allow the boom to swing past the canoeist's breast when the sail is jibbed or brought over. This also allows the luggage-bag to be between the stretcher and the mast. Thus the mast-hole H is at 3 feet 6 inches' distance from the stem. The mast-step is a simple wedge-like piece of oak (see R, fig. 14), made fast to the keel, and abutting on the garboard streak on each side, with a square hole in it for the foot of the mast. It may be thought that the mast is thus

stepped too far forward, but the importance of having the sail free to swing, without lying against the canoeist's body, or getting entangled with his paddle, which is used for steering, is so great, that some sacrifice must be made to secure this point. However, it is found that the boat sails very well on a wind with this sail, if the breeze is strong; and in light breezes it is only expedient to sail with the wind well aft, when the jib can also be used. A canoe must have a strong, light, flexible painter, suitable for constant use, because a great deal has to be done by its means in towing on dull water, guiding the boat while wading down shallows or beside falls, lowering into locks, hauling her over hedges, walls, locks, banks, and even houses; and raising or lowering her (with luggage in) to and from steamboats. The "Alpine Club" rope, used in the new *Rob Roy*, was found to be hard and "kinky" when wet, and the softer rope used in the old *Rob Roy* was far better. Another kind of brown-tanned rope has been recommended. The painter should not be longer than twice the length of the boat. Each end is whipped with wax-end, which sort of fine twine is also invaluable for all the other fastenings, as it never slips. The painter passes through a hole in the stem, and another in the sternpost, and is drawn tight to lie on deck in the lines AY and SY, fig. 2; the slack of about four feet is belayed round the wind-

ward cleat and coiled outside, so that it may be seized instantly when you go ashore, or have to jump out to save a smash or an overset in a dangerous place. This mode of fixing and belaying the painter I adopted after numerous trials of other plans, and it is found to be far the best.

"The jib is a triangle of 3 feet hoist and 3 feet foot, the fore-leach fast by a loop, passing under the painter and over the stem; the head is fixed by a loop over the mast-head, and under the flag-staff button. Thus the jib can be struck while the canoeist remains in the boat, by pushing off these two loops with his paddle. To set the jib, it is best to land. This is much more generally convenient than to have jib-tackle on the mast. The sails are of calico, without any seam. This lasts quite well enough, dries speedily, and sets well, too, provided that care is taken to have it out with the selvage along the after-leach, and not along any of the other sides. Inattention to this last direction simply ruins sails; and it cannot be too often repeated that the success of the two voyages of the *Rob Roys* could not be expected if great care had not been devoted to all these details. The new *Rob Roy* may, of course, be improved upon; but I have not one suggestion to make except as to the cooking-apparatus, which, in this case, used for the first time, was open to many alterations. But while it is desirable that canoeists

should experiment in all directions, it is hoped that young sailors will try first, at least, the plans here explained, and which have stood the severe tests under which perfect success and continual enjoyment were obtained.

"The *Rob Roys* were built at Messrs. Searle's, of Lambeth, where some twenty-three others have been lately constructed. Mr. Simmons, of Putney, and Mr. Wheeler, of Richmond, have also built some according to the same design, while a large number of canoes have left the stocks in various parts of the country. A good travelling canoe, costing 15*l.* ought to last a long time, for it is not racked and pulled in pieces at every stroke, as a rowing boat is. The sails, apron, luggage-bag, and outfit, can be had at Messrs. Silver's, of Bishopsgate; the flag and blocks at the Model Dockyard, Fleet Street, where the 'Handy Book' is published; and the boom and yard and woven cord, at Farlow's, in the Strand.

"About 200 canoes were built lately on this model. The Canoe Club has already more than 100 members, and last summer two of them paddled across the British Channel, three of them went all round the Isle of Skye, and one coasted along the Mediterranean to Genoa."

It is possible that there are many other craft worthy of description, but I must confess that I do not know of them. My aim has been, under

the title of a "Boy's Own Book of Boats" and vessels, to give a sketch of the existing state of naval architecture throughout the world, and I may venture to hope that many will derive both amusement and instruction from it on a very important subject.

THE END.

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